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Lunds Tekniska Högskola

***Changes and Challenges of ERP Implementation
in the Context of Procurement and Supply Chain
Processes***

- A Case Study at Maersk Drilling

Master of Science Thesis in Industrial Engineering and Management

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Sincerely,

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Abstract

Title: The Changes and Challenges of ERP Implementation in the Context of Procurement and Supply Chain Processes

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Problem Discussion

The oil and gas sector is not very mature in terms of supply chain management. The chosen case company, Maersk Drilling (MD), has problems with a split IT-landscape with poor data quality. It has caused problems with inefficient and complex processes with much communication required, parallel information and more. Within procurement it translates to problems in spend management and time wasted with tracing orders.

The ERP system plays an important role in supporting information sharing, cross-functional ways of working and a better overview. By introducing a new ERP system some major changes are expected within supply chain and processes will have to be changed. The ERP project is significant hence there are many stakeholders who may perceive the potential challenges differently.

Purpose

The purpose of the study is to dig deeper into how the change with a new ERP system will affect the procurement and supply chain processes at Maersk Drilling. The changes bring challenges as well. The study gives a deep understanding of the perceptions of challenges from the different actors. It is important in order to see if everyone works towards the same goal.

Methodology

This thesis is a qualitative single case study. The theory was gathered prior to a pre-study that was made at the company in order to grasp the problem and come up with the research questions. Thirteen interviews were made and archival data from the company was collected. This provided several sources of data and triangulation was possible. The data collection was then matched with the theory in order to secure that the theory would cover the specific research questions. After that the analysis was conducted where empirical data was compared with the theory. Finally the conclusions from the whole study were drawn.

Frame of Reference

The reasoning when setting the theoretical framework was that the ERP project is the start of a radical change in the way of working at MD. Many processes are redesigned or improved. The whole study is within the procurement and supply chain area and with this reasoning we then set up the structure for the theoretical framework containing the three areas; Procurement and SCM, Processes, and ERP. In the latter change management plays an important role since the new system means a major change in the way of working for many persons at the case company.

Conclusions

ERP has been an enabler for the changes and the new processes will become more streamlined, standardized and cross-functional. Increased information sharing will help MD to work more efficient and additional/improved data will give MD an enhanced overview in form of management reporting. The new ERP system was not affecting the level of centralization very much, since the structure of decisions in procurement was not changed. The challenges in implementing these changes have been communicated well between the stakeholders and the view of the challenges is overall unified. Master data was perceived as the biggest challenge, most likely since the project is in the establish phase and that MD has a starting point with very poor data. The data quality is of high

importance when migrating data to the new system. MD furthermore needs to look closely at how the offshore personnel perceive the project and how they will meet the changes. The vision was also containing technical and management jargons, which makes it less understandable. Today they use good information and many channels but MD needs to make sure that the communication reaches the end users to achieve buy-in.

Keywords

Supply Chain Management, Procurement, Processes, Change Management, ERP, Perceived challenges, Oil and Gas.

Sammanfattning

Titel: Förändringar och utmaningar med ERP-implementering i inköps- och försörjningskedje-processers sammanhang

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Problemdiskussion

Sektorn för olja och gas är inte särskilt mogen när det gäller kunskapen om försörjningskedjor. Det valda företaget för fallstudien, Maersk Drilling (MD), har problem med ett splittrat IT-landskap och dålig datakvalitet. Det har orsakat problem med ineffektiva och komplexa processer där det krävs onödig kommunikation, parallell inmatning av data, etc. Inom upphandlingar och inköp leder det till problem med förståelsen för hur pengarna spenderas och tid slösas bort med att spåra order.

Affärssystemet (ERP) spelar en viktig roll för att stödja informationsutbyte, tvärfunktionella arbetssätt och ge en bättre överblick. Genom att införa ett nytt affärssystem väntas stora förändringar inom leveranskedjan och processer kommer att behöva ändras. ERP-projektet är så pass omfattande och de olika aktörerna kan därför uppfatta de potentiella utmaningarna på olika sätt.

Syfte

Syftet med studien är att gräva djupare i hur förändringen med ett nytt ERP-system kommer att påverka inköp- och logistikprocesser hos Maersk. Eftersom ERP-projektet är stort med många personer inblandade, kommer det att innebära förändringar i organisationen och i de roller och ansvarsområden som finns. Det är viktigt att få en djup förståelse för de

olika uppfattningarna i projektet när det gäller utmaningarna, för att se om alla arbetar mot samma mål och har samma uppfattning.

Metod

Avhandlingen är en kvalitativ fallstudie. En del teori studerades inför en förstudie som gjordes på företaget för att förstå problemet och komma på de forskningsfrågor som avhandlingen skulle bygga på. 13 intervjuer gjordes och arkivdata från företaget samlades in. Detta gav forskarna flera datakällor och triangulering var möjligt. Datainsamlingen matchades sedan med teorin för att säkerställa att teorin skulle täcka de specifika forskningsfrågorna. I analysen jämfördes empirisk data med teorin och slutligen så drogs slutsatserna från hela studien.

Referensram

Resonemanget när den teoretiska ramen framställdes var att ERP-projektet är början på en radikal förändring i sättet att arbeta på MD. Många processer kommer göras om eller förbättras. Hela studien är inom inköps- och försörjningskedje-området och med detta resonemang skapades sedan en struktur för det teoretiska ramverk som innehåller de tre områdena; *försörjningskedjor och inköp, processutveckling* och affärssystem (*ERP*). I den sistnämnda inkluderas även förändringsarbete vilket spelar en viktig roll då det nya systemet innebär en stor förändring i sättet att arbeta för många personer på fall företaget

Slutsats

Affärssystemet har varit en möjliggörare för förändringarna och de nya processerna kommer att bli mer effektiva, standardiserade och tvärfunktionella. Ökad informationsdelning kommer att hjälpa MD att arbeta mer effektivt och utökad/förbättrad data ger MD en överblick i form av ledningsrapportering. Det nya affärssystemet påverkar inte graden av centralisering nämnvärt eftersom strukturen av besluten i inköpsprocessen inte kommer förändras. Utmaningarna med att genomföra dessa förändringar har kommunicerats väl mellan de berörda parterna. Master data uppfattades som den största utmaningen, troligen eftersom projektet

är i etableringsfasen och MD har en utgångspunkt med dålig data. Datakvaliteten är även av stor betydelse vid förflyttning av data till det nya systemet. MD behöver dessutom titta närmare på hur offshore personalen uppfattar projektet och hur de kommer att bemöta förändringarna. Visionen innehåller teknisk och administrativ jargong, vilket gör det mindre begripligt, och den behöver utvecklas. Idag använder många informationskanaler, men MD måste se till att kommunikationen når slutanvändarna för att få dem att anamma det nya systemet.

Nyckelord

Försörjningskedjor, Inköp, Processer, Förändringsarbete, ERP, Utmaningar, Olja och Gas.

Abbreviations

BPR: Business Process Reengineering

BRG: Business Reference Group

CEO: Chief Executive Officer

CFO: Chief Financial Officer

CM: Change Management

ERP: Enterprise Resource Planning. Business management software with integrated applications.

ERPX: The ERP system that has been used on the rigs and will be replaced with a new ERP system.

GPRO: Group Procurement, the central purchasing unit in Maersk.

GSS: Global Service Stock, is working as a normal warehouse where items that are required by rigs or customers to be on stock can be held.

KAM: Key account manager who is responsible for the purchases for a rig.

MD: Maersk Drilling

MDPRO: Procurement department at Maersk Drilling

OIM: Offshore Installation Manager, designated by owner to be command of the unit.

PETIL: a government regulator for the Norwegian petroleum industry.

PM: Programme Management, referring to ERP Programme.

SCM: Supply Chain Management

SRM: Supplier Relationship Manager

TL: Team Lead

TM: Team Member

Expressions

Some specific expressions are used. Here they are shortly described.

Catalog: A list of specified items with ready agreements and material numbers from which an item can be chosen.

Firefighting: Term used for when something needs to be fixed as quickly as possible. Often at high costs and involvement of many persons.

Freetext order: A kind of order where no materials number needs to be used, a short message with a free description of the needed part and quantity.

Materials Man: Works with logistics on the oil rig.

Shorebase: The shorebase is handling administration, purchasing, IT and more amongst other things for the rig.

Spend Management: A business function in which businesses gain visibility, establish controls - consisting of system controls and organization policies, in order to manage their business spend. The function involves managing the full lifecycle - from Sourcing and selecting the suppliers, establishing contracts, purchasing and managing payments to suppliers.

Three-way match: when the purchase order is matched with the goods received and the invoice. Then the payment to the supplier is made.

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Introduction

The introduction describes the background to the thesis, what the purpose is and the problem statement with the research questions. It also brings up the delimitations of the thesis and in the end a table is presented with an outline of the thesis.

1.1 Background

ERP (Enterprise Resource Planning) is business management software that is closely connected to the business activities and processes in a company. It is an integrated information system that spans across the organization and a powerful tool to change, integrate and automate business and system processes. Today ERP is considered as a necessary ingredient that is required to stay ahead of the competitors and succeed in the current dynamic business environment (O'Brien & Marakas, 2010). It helps to provide significant improvements in efficiency, productivity, service quality, reduction in costs and in effective decision-making (Ngai et al., 2008).

The procurement function consists of several activities, like setting specification, selecting supplier, negotiating and monitoring the supplier. Some activities are of an administrative nature. Procurement can be affected by an ERP system by minimizing administrative tasks (Velcu, 2007) as well as getting better quality in the data (Gattiker & Goodhue, 2005). In supply chain management the goal is to lower costs and increase customer service. It can be achieved via information sharing and coordination, where IT systems can play an important role.

A study of how the processes connected to purchasing and supply chain management changes with a new ERP system is interesting since process change as well as ERP implementation means changes and are deeply connected with each other. Taking into consideration that the processes of purchasing are deeply connected with the ERP system since some are of an administrative nature, the purchasing area is perfect for studying the process changes. Supply chain management in a company is closely connected to the ERP system as well, with activities as sharing inventory

information, tracing material and since IT is vital for cost-effective supply chain management (Lee et al., 1998).

When implementing a new ERP system in a company it is a major change, which will affect many employees and their way of working. One of the fundamental sources of resistance is perceived risks (Aladwani, 2001), why it is a relevant area to study in connection with the new ERP system. Change management plays an important part here in communicating the change and having a clear vision for the future state. It is also important to make the change stick (Kotter, 2011). Mismatches between ERP and organization can have significant impacts on organizational adoption, which could be the main reason causing ERP implementation failure (Umble & Umble, 2003). Changes in ERP often means that the organization is affected, one of the effects is more de-centralized decision-making (Velcu, 2007). ERP is also a way of changing business processes, to enable improvements (Singla, 2008). When changing business processes it is important to have top management support and use change management just as with an ERP implementation. In the thesis, the core processes affected are the purchasing process and supply chain processes. An illustration of the relationship between these areas is seen in figure 1 (see more under chapter 3).

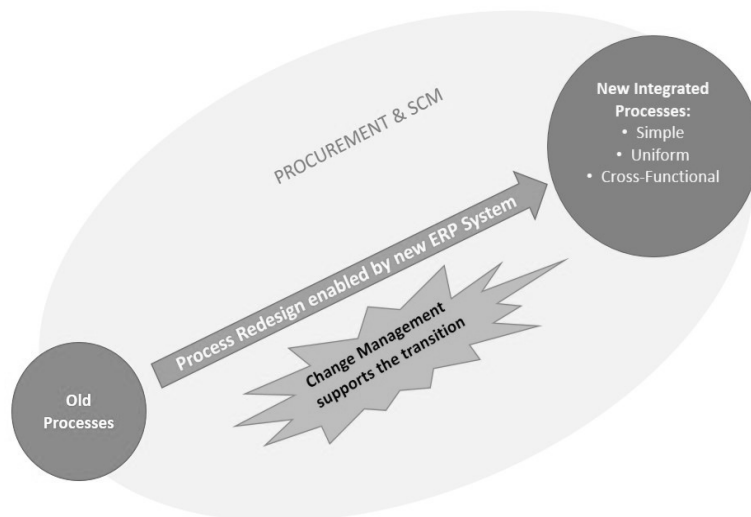


Figure 1 Illustration to help the reader understand the relationship between the different areas

1.1.1 The oil and gas sector and the case company

Oil companies use drilling services to explore and drill holes for finding oil. A rig or drilling boat is often far away from shore and might be drilling under harsh conditions. This makes the supply chain task cumbersome and long lead-times are common. It is not unusual that it takes several months from that order is laid until the item is on the rig. The costs for a standstill in the business are very high and the most important measure is uptime of the rig. (Internal information 2013)

The industry itself can be said to be quite immature. The collaboration with suppliers is low and the supply chain function is not very developed compared to for example the automotive industry. Forecasting is not used at all. There are a few big suppliers of oilrigs, which are very busy, and the relationship is not very developed. The relation between the oil companies and the drilling companies is generally good. The communication with the rigs is usually made via telephone and internet via a satellite connection that is not very stable or fast. Generally speaking the offshore personnel is a bit conservative and not very open to change (General Manager Procurement).

MD is specializing in oil drilling services in harsh and deep-water environment operation. The customers are oil and gas companies who want to drill holes to explore where the oil is. After the exploration-rig has been drilling, if there is oil in the well, the oil company will put a production rig there to take up the oil. MD has a young fleet and the rigs are equipped with advanced technology to stand the harsh conditions (MD Annual report 2012).

1.2 Purpose

The purpose of the study is to dig deeper into how the change with a new ERP system will affect the procurement and supply chain processes at Maersk. The study brings valuable information on how to handle process changes in supply chain and procurement. It looks into the benefits with an ERP system from a process perspective related to supply chain and

procurement activities. The case study also provides a detailed description of changes in purchasing processes that can come with a new ERP system.

Since the ERP project is big with many persons involved, it will mean changes in the organization as well as in the roles and responsibilities. The purpose is to see how the different actors involved perceive the challenges ahead. It is to see if everyone sees the same challenges and the differences.

This will lead to an increased knowledge in procurement process change connected to ERP systems and is something that can give an objective view and feedback to the participants of the project. The case means an opportunity for other researchers to compare their own situations and findings.

1.3 Problem discussion and research questions

MD today has a split IT-landscape with two different IT-systems. This has caused problems with latency on the rig when using the system, inefficient and complex processes with many emails required, parallel information, hard to trace orders, etc. The new ERP system was the start of making processes at MD simpler, more uniform, more cross-functional and increasing the information transparency in the company. The ERP project has been started in order to secure a good implementation and making the system and processes fit together. This means that processes at MD can remain, stay as it is or be completely re-designed in order to fit with the new ERP system. Most organizations need to adapt or rework their processes when getting a new ERP system and it is important to have an organizational view (Davenport, 2000). The changes in the procurement processes involve both organizational changes as well as the implementation aspect, which is connected closely to the ERP system. The process ownership of some procurement processes will change from Maersk Group Procurement to MD during implementation. It is therefore important to see how the procurement organization will change by the new ERP system.

At MD, procurement and supply chain management are essential to support the uptime of a rig, and it is here that some of the main benefits of the new ERP system is expected, why it is a given area to study. Expected benefits include transparency, simpler processes, increased coordination in the company and better data quality, which leads to more informed decisions and overview. The change of a process most often has problems connected to change management (Grover et al., 1995), as does an ERP implementation. All these aspects are tied together when investigating how procurement and supply chain processes are changed. The study took place before the implementation of the system when the new processes were designed.

In the project there are vendor consultants, implementation consultants, people from MD as well as people with end user experience and with good knowledge in procurement. The participants may perceive the potential

challenges in such a vast project differently. The perceived challenges is a relevant area to study, in a project with many different actors, and where change management plays an important role. The research questions ties together the process changes in the most relevant areas of procurement and supply chain management with a new ERP system, with an organizational perspective connected to change management and how to approach possible challenges.

In order to get knowledge in how the changes with the new system affect the processes the study explored what changes were made and the researchers got a deeper understanding of the changes and challenges.

The research questions that the study answers are:

- 1. How are supply chain and procurement processes changed by a new ERP system at Maersk Drilling?***
- 2. How do the different parties involved perceive the challenges related to the change of supply chain and procurement processes?***

Definitions of what is meant:

Changes: The changes that affected how the process was carried out, its structure, its relation to other processes and its role in the supply chain and procurement area.

Challenges: The possible difficulties ahead related to the change of the processes and the ERP project in a supply chain and procurement context.

1.4 Delimitations

The delimitations were that the study only treated the procurement and supply chain processes of MD. It was delimited to this area because the researchers wanted to research one relevant area throughout and procurement and supply chain were very important processes in the project. The study was also delimited to the companies that were directly involved in the ERP project and the procurement and supply chain processes. These companies had relevant input and views on the changes, which unrelated companies did not have. Since the project was found to

mostly improve the internal processes at MD, that is where the biggest changes was found, and not so much in relation with customers and suppliers. The study was done before the implementation was executed, but the process designs were completed. The reason for the chosen point in time was that the persons interviewed had the process changes fresh in mind since they had just been working on it and it was the only opportunity to capture the perceived challenges before the implementation. The study was limited to two months and it was also limited to the persons interviewed because of the magnitude of the study and access of relevant persons.

The researchers chose not to use a quantitative approach since the purpose was to make a detailed descriptive and explanatory study for which a qualitative approach was a better fit.

1.4.1 Target group

The target groups for the thesis are the managers in procurement at MD as well as the persons involved in and affected by the ERP project. Academic researchers within supply chain, procurement and ERP systems are another target group, who can find the study useful to compare research with. Students that are interested in ERP projects and procurement are also part of the academic target group.

1.5 Thesis outline

Describes the disposition of the report in table 1 below.

Table 1 The outline of the report

<i>Topic</i>	<i>Chapter</i>	<i>Objective</i>
<i>Introduction</i>	<i>1</i>	The introduction describes the background to the thesis, what the purpose is and the problem statement with the research questions.
<i>Methodology</i>	<i>2</i>	This section presents the approach of the study and what type of research method that has been used. It presents a motivation for the choices

		made in the collection of the theoretical and empirical material. The final part of the chapter discusses the credibility in terms of reliability and validity.
<i>Theoretical Framework</i>	3	The theoretical framework describes the Supply Chain and purchasing processes. Secondly processes will be described followed by ERP systems and its implementation challenges, which involves change management that is required in order to achieve a successful transformation.
<i>Empirical Data</i>	4	Here the data is presented from interviews, questionnaires and archival data. The empirical chapter is descriptive to show how the situation is today at Maersk Drilling and what the different actors says about the changes in processes and upcoming challenges.
<i>Analysis</i>	5	In this chapter the empirical data will be compared with the theory. The analysis will handle the research questions and relate to the changes and challenges concerning the Procurement and SCM processes.
<i>Conclusion</i>	6	This chapter answers the research questions and the conclusions are based on the analysis in the previous section.
<i>Recommendation</i>	7	This chapter follows up the previous conclusions and gives recommendations and proposals for further research.

2 Methodology

This section presents the scientific approach of the study and what type of research method that has been used. It presents a motivation for the choices made in the collection of the theoretical and empirical material. The final part of the chapter discusses the credibility in terms of reliability and validity.

2.1 Scientific approach

Methodology describes the basic way of working and it sets up frames and guidelines for how to approach the problem. There are three basic views on knowledge that are to reflect on the purpose of the thesis. These have been generally accepted and are the analytical approach, the systems approach and the actors approach (Arbnor & Bjerke, 1997). These approaches differ widely and the results of the thesis will vary depending on the choice of approach. In the following part these approaches will be described and then the choice of our approach will be presented.

2.1.1 Analytical approach

This approach is also known as the reductive approach and is a bottom-up approach where the whole is viewed at as the sum of its parts. It can be called reductive as it seeks to reduce a system to its elementary parts in order to study and understand the interactions between them. Therefore it is often used when there are requirements for simplicity (Holme & Solvang, 1997).

$$\textit{Part A} + \textit{Part B} = \textit{The whole}$$

According to the analytical approach the world is an objective reality where cause-effects can be identified in deterministic phenomena and correlations in stochastic phenomena. This way of seeing it means that knowledge is independent of the observer. Furthermore it means that by studying different parts one can draw conclusions from the total picture (Gammelgaard, 2004). It is natural that logic and mathematics have a dominant role in the analytical view, as they are not subject to sensory

illusions (Arbnor & Bjerke, 1997). The goal of this approach is to describe the truth as objective and complete as possible.

2.1.2 Systems approach

Unlike the analytical approach, the systems approach is a top-down approach where the whole differs from the sum of its parts. It implies that relations, connections and synergies between the parts are also important to consider as they influence one another (Gammelgaard, 2004).

$$\textit{Part A} + \textit{Part B} \neq \textit{The whole}$$

These links, which causes interactions between the parts, might result in minus or plus effects that must be taken into consideration when making conclusions. This makes it an appropriate approach when the attempt is to find solutions to problems that can work in practice, rather than finding the “real truth” as in the analytical approach (Gammelgaard, 2004).

According to Checkland (1999) a system has six elements:

- **Transformation**, which transfers something from input to output.
- **Owners**, who can open and close the system.
- **Actors**, who performs activities in the system.
- **Customers**, inside or outside of the system.
- **Environment**, which defines the limits of the system.
- **Purpose**, which puts the system in a context.

2.1.3 Actors approach

The actors approach has a completely different perception of reality than the analytical approach as it argues that the world is not objective. It is however, similarly as the systems approach, a top-down approach and the observer is seen as a reflective and creative human being where focus is on understanding the social wholes. Furthermore it is an approach where the whole cannot be described as a sum of its parts. The difference to the systems approach in this view is that the explanation of the reality is not objective but depends on the actors experience and action. The reality is a social construction that affects, and is affected by actors (Björklund & Paulsson, 2003).

2.1.4 The scientific approach in the thesis

Since the research questions are directed at the ERP system, the relating processes and different parties' view of the challenges the approach will have to be a combination of systems approach and actors approach. The reasoning to this is the following:

The analytical approach supports the logic where the changes of the processes and the benefits that come from them can be accumulated. Often process changes have connections with other processes and the synergies between them will be disregarded with the analytical approach, making it an option that would not serve our purpose. The systems approach however would better describe these changes as it takes considerations to the interactions and synergies. It would give a holistic view, which is beneficial to use in work with processes (Ljungberg & Larsson, 2012) and also since the supply chain itself involves many actors, functions and activities, which fits the description of a system (Checkland, 1999). It is also a better option since the challenges concerning the implementation are not single challenges but often combinations that affect each other. In this way the case will seek to study phenomena in their contexts, rather than independent of context (Gibbert et al., 2008).

To respond to the research question about the perceived challenges the actors approach needs to be taken. As this part concerns change management, which is closely related to social behaviors and individual transitions, it takes considerations to the fact that the involved parties can describe the reality in different ways.

When applying the systems approach, the system needs to be defined in order to understand the parts and to find a solution that works. The system (an in-depth description can be seen in empirical chapter, actors and organization) in the study for the procurement and supply chain processes is defined as the following:

- **Transformation**, from a requisition to a delivery of material to the rig.

- **Owners**, MD are the owners who have the final saying in the system.
- **Actors**, the materials man on the rig places requirements to get material. Maersk Group Procurement selects the suppliers and buys the material needed. They manage the warehouses and logistics for getting the material to the rig as well. Maersk procurement manages the high-level procurement strategies and has outsourced the procurement to Maersk Group Procurement.
- **Customers**, the rigs are the customers who are served by the procurement and supply chain activities. The end customer is the oil company that has hired Maersk drilling.
- **Environment**, The environment is limited to the rigs, shorebases and warehouses.
- **Purpose**, the purpose is to supply the rigs with material when needed at the best possible price and quality to ensure a high up-time for the rig.

As mentioned earlier we have not studied the whole of Maersk Drilling but delimited the thesis to the procurement and SCM departments. The transition from the old two-system landscape to the new one has not yet taken place and the thesis will highlight the challenges with this and the way it will affect the processes in these departments. The systems approach is therefore a way for the researchers to get an understanding of the interactions between the different functions of Maersk Drilling such as the offshore rigs, on shorebases and the Procurement and SCM. In summary the scientific approach is a combination of the systems approach and the actors approach.

The study was mainly a combination of descriptive and explanatory study since the purpose was to and understand and explain how the processes were changing as well as describing the perceptions of different challenges.

2.2 Research methods

2.2.1 Inductive, deductive and abductive methods

There are mainly two approaches to research in general, the inductive approach and the deductive approach. There is also a combination of these two that is known as the abductive approach, see figure 1.

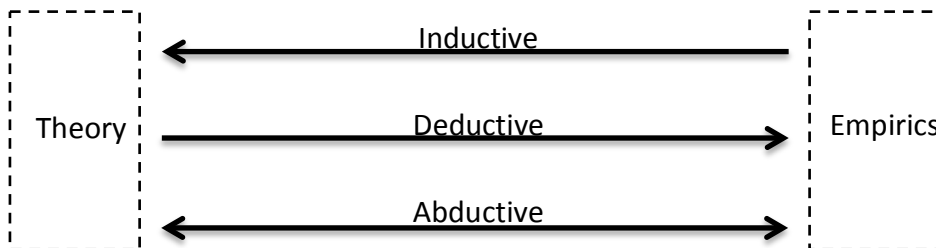


Figure 2 Illustration of inductive, deductive and abductive approach (Björklund & Paulsson, 2003)

The inductive approach is based on observations with a starting point in facts. It means that one starts in reality to detect patterns from which conclusions can be drawn and to create a theory. By doing this the researcher moves from observations to a general rule, i.e. from empirics to theory (Kovács & Spens, 2005).

The deductive approach works the other way around as it instead derives conclusions from theory. The main objective of a researcher using this approach is to base the data on theory and then test the theory through data (Björklund & Paulsson, 2003).

The abductive approach is a mix between induction and deduction as it involves moving between practical observations and theoretical models. It constantly switches between empiricism and theory before definitive theoretical models are established (Björklund & Paulsson, 2003). The abductive approach is a commonly used method in case studies as the data collection and theory development often is conducted simultaneously (Kovács & Spens, 2005).

2.2.2 Qualitative and quantitative methods

Quantitative methods are based on statistical information that can be classified by values and analyzed through mathematical methods. It is the objective part and is designed to quantify phenomenon and how they respond to changes in the environment.

Qualitative data is the data that consists of words and descriptions allowing more details and nuances in the analysis (Höst et al., 2006). Qualitative researchers imply that by using a qualitative approach the observations and interviews get closer to the actors perspective. This makes it usable when the collection of data is used to visualize and describe the reality to the spectator (Näslund, 2002). Qualitative methods are less formalized and structured than quantitative methods making it more explorative in its nature and therefore suitable in interviews and observations (Björklund & Paulsson, 2003).

2.2.3 Research approach in this thesis

For the study an abductive approach was selected, which also was in line with the explanative approach and the case study. This approach is based on the fact that researchers rarely follow the pattern of pure induction or deduction. Instead it enables the researches to reduce the gap between the theoretical and the empirical data by circulating between the two and thereby integrating the derived data.

In the thesis theory was gathered prior to the real-life observations where relating articles were analyzed. After this a pre-study was made at the company in order to grasp the problem and come up with the research questions and get an additional overview of the theory. The data collection was at this stage matched with the theory in order to secure that the theory within the delimitations was met and to make sure that the theory would cover the specific research questions. Digging deeper in empirical data during analysis to verify and fill out missing gaps made the analysis more complete. Finally the data and the analysis were verified with the company (empirical data). A flow of the research is illustrated in figure 2.

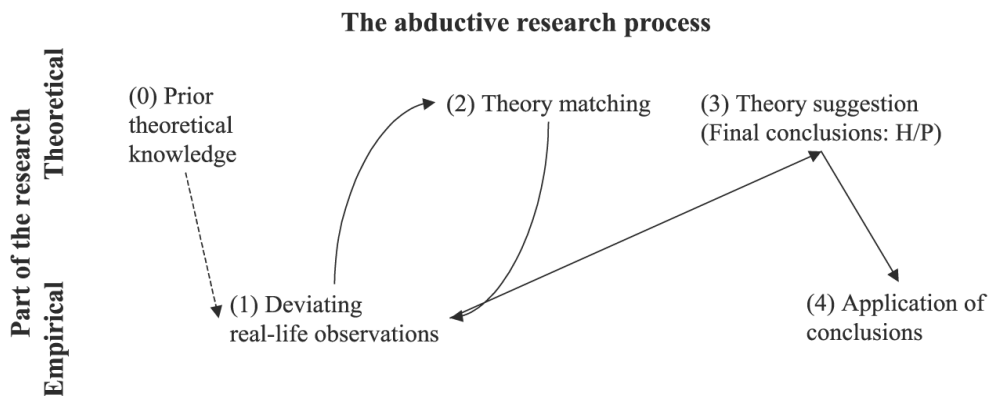


Figure 3 The abductive research process (Kovács & Spens, 2005)

The study was of a qualitative character since the data consisted of words and descriptions mainly (from interviews), to describe the reality. The questionnaire was used to get a perception of the interviewed person's view and did not bring any a statistical significance. The questionnaire made it possible to make the person take a stance on different statements in short time.

2.3 Case study approach

According to Höst (2006) there are several ways of working:

- An *exploratory* approach has the purpose to really understand in depth how something is functioning or executed.
- A *descriptive* approach is meant to find out and describe how something is functioning or being executed.
- An *explanatory* approach is looking for reasons and explanation to how something is working.
- A *problem-solving* approach is meant to find a solution to a problem that has been identified.

The case approach involves empirical research and is often used for complex phenomena. "A case study is an empirical enquiry that (1) investigates a contemporary phenomenon within its real life context, especially when (2) the boundaries between phenomenon and context are not clearly evident" (Yin, 2003). Case studies are appropriate for complex

issues since they deliver a thorough, and detailed description, from primary data (Dubois & Araujo, 2007). The rich context can also contribute to extensions or contradictions of existing theories (Stuart et al., 2002). This makes it possible to answer questions like “Why?” and “How?” (Yin, 2003). One of the great strengths of case studies is the flexible method (Yin, 2003). Case studies are suitable when the problem is unstructured and complicated, and the major variables need to be mapped (Stuart et al., 2002).

A downside with the case approach is that it often makes it harder to generalize the findings (Yin, 2003). It is important to review knowledge in related fields, when doing a case study. Operations management researchers often pursue research as explorative or descriptive, when in fact they are more likely to be theory extensions or validations, resulting in low yielding research. Recognizing that the method is appropriate and generalizing findings from theory is critical before defining the research problem (Stuart et al., 2002).

2.3.1 In the study

The study was mostly descriptive but also explanatory. The descriptive part was describing the situation at Maersk in detail (see the empirical chapter) and in the explanatory part, patterns were compared to explain differences in viewpoints among the stakeholders, as well as differences between theory and the study.

The case is of a complex nature as the areas of ERP, purchasing processes and changes all are going into each other. The problem required visits during the pre-study to get a picture of what was happening. The flexibility of the case study design and possibility to grasp the problem were of great help and a reason to choose a case study design. The research questions are “How?”-questions and therefore a case approach was a good choice to get a deep understanding.

In the thesis simple pattern analysis was used to explain the results as well as a descriptive approach. The descriptive part of the study provides valuable material for other researcher and an outside perspective for

Maersk Drilling. The theory was carefully studied before the problem was defined. The combination of looking at how process changes in connection with perceived challenges is not common and gives a valuable perspective. Valuable in the sense that the situation is common with many actors in an ERP project and differences in perceived challenges affects the actions and how aligned the project is.

2.3.2 Case study design

The major types of case studies are seen in figure 3. The case can be with a single case or multiple ones. The study can either be holistic or embedded, depending on the number of units of analysis. The unit of analysis, i.e. “what the case is designed to study” is closely connected to the research question. The unit of analysis helps to find relevant cases (Yin, 2003). A case study about one organization or phenomena is a holistic one and has outcomes only related to one unit of analysis. If there are subunits inside the unit of analysis, and the study have outcomes related to different subunits it is an embedded study. The holistic approach is good when there are no logical subunits, but might be too general and abstract and lack clear data (Yin, 2003). The danger with an embedded design is having too much focus on the subunits and fails to return to the larger unit of analysis (Yin, 2003).

	Single-case design	Multiple-case design
Holistic (single unit of analysis)	Type 1	Type 3
Embedded (multiple units of analysis)	Type 2	Type 4

Figure 4 Case study designs (Yin, 2003)

Generally multiple cases studies are stronger in evidence than single-case studies (Yin, 2003). There are however reasons to use a single case study. The risk of focusing too much on measurability in a case study is that the rich contextual content suffers, making the study hard to use as a detailed story for researchers to compare their own experiences and get theoretical

insights. The possibility to recognize phenomena and get “aha” moments is one of the major strengths of single case studies (Dyer & Wilkins, 1991).

The argument to use a multiple case study to get more statistically correct findings is problematic when comparing case studies with pre-statistical research (Dubois & Araujo, 2007). A single case tends to capture more deep understanding of the social dynamics, than the multiple case studies with “thinner” descriptions, which risks generating a distorted picture (Dyer & Wilkins, 1991).

2.3.2.1 This case is embedded

The main unit of analysis was the procurement and supply chain processes in connection to the new ERP system. The study was embedded, since there are outcomes related to perceived challenges as well as process changes. These are two different subunits (units of analysis), since one is focused on the process changes and the other has a risk perspective. The researchers got detailed data from the questionnaires and interviews, but still connected to the whole organization by discussing the findings in a holistic way with the supervisors and interviewees.

2.3.3 Case Selection

The reasons for choosing to do a single case study can vary. Yin (2003) suggests that the reasons can be; the case is unique, it is a representative case, it is a case which reveals a phenomena that is difficult to access or has not been accessible so far, the study is longitudinal with at least two points in time or if the case is a pilot case in a multiple case study.

Maersk Drilling was chosen because they were in the middle of an ERP project, designing the processes. The authors had a unique possibility to do research at the firm and get access to information material. It was a company of adequate size and a project with enough complexity to make the case interesting.

The case is representative, in many ways. Changing an ERP system offers many challenges that any type of company has to face, such as change, dealing with master data, process redesign and fitting the system with the

existing business processes. The case also studies how the procurement organization is affected by the ERP system, something that every company with has to deal with when doing changes to the ERP system. Maersk Drilling is a typical drilling company, and the lessons learnt from the study is applicable to other companies in the drilling sector and oil and gas industry as well, especially in how to handle the change and the situation with the rigs. The procurement and supply chain activities are typical for an oil and gas company as well, and how those are affected is representative material that can be of great value to other companies in the business.

2.4 Data collection

The data collection is crucial in order to cover all the aspects of the thesis. The data collection can be done in a variety of ways and the choice of how depends on the methodology of the thesis. Before the thesis starts it is therefore important to consider what type of information that is needed (Björklund & Paulsson, 2003).

2.4.1 Primary and secondary data

Primary data is data gathered from a primary source, such as interviews, questionnaires and observations. Information from books, archival records, journals and internet is secondary data (Ghuri & Grönhag, 2002). However, documents and material culture that is from the company is primary data (Marshall & Rossman, 2009).

2.4.2 Archival records

Based on Yin (2003), archival data is precise (with names and details). Other strengths are that the data is stable (retrieved several times), not created for the case study and it often has a broad coverage with many events, time span and settings. The weaknesses are that the data can be collected selectively if the collection not is complete, it can be biased as well from the author. Another problem can be limited access.

2.4.3 Survey and questionnaire

A survey means that the researcher can make a detailed and exhaustive examination. It is characterized by having a wide coverage and to be done

at a certain point in time and being empirical. A survey is typically focused on results that are measurable (Denscombe, 2009). To achieve this, the survey needs to be standardized and contain, on a forehand, decided questions. These questions can be binary questions (yes or no) or completely open where the interviewee is given the chance to answer in freetext form. The advantage of using a survey is that it makes it possible to gain quantitative data from qualitative question. However, the surveys can also lead to misinterpreting since there is no possibility to ask follow-up questions (Björklund & Paulsson, 2003). In surveys questionnaires can be used to collect information.

A questionnaire is a series of questions posed to a person. The purpose is to gain information on the person's attitudes and getting information straight from the source (Denscombe, 2009). A case study can typically combine surveys and interview data and archival data (Eisenhardt & Graebner, 2007).

2.4.4 Interviews

An interview differs from a conversation in that the interview includes assumptions and knowledge about the situation, which is normally not the case in a normal conversation. In an interview there is a willingness to participate, the words said by the interviewee can be regarded as documented and the researcher decides the agenda for the meeting (how much the researcher controls the interview depends on the style he or she has). Interviews are good to use to recognize feelings and experiences, to talk about sensitive information or privileged information where key persons have very detailed information (Denscombe, 2009, p 233).

There are several types of interviews according to Denscombe (2009). Structured interviews means that the researcher has a strong control over the situation and is similar to a survey with ready questions and limited response selection. Semi-structured interviews means that the researcher has a list of topics to be discussed, but the researcher is flexible in the order the subjects are discussed and lets the interviewee develop his or hers ideas and use open answers. In unstructured interviews the

researchers' role is to be as little involved as possible. Interviews can be conducted as person interviews with one person. Another way is group interviews with several persons to increase the participants in the research and where the questions go via the researcher. In focus groups, group dynamic is used to understand attitudes and is more interactive. The researcher plays the role of a moderator, to ease the conversation (Denscombe 2009).

When researching phenomena, in-depth interviews (one hour or more) are often used to understand the situation from the interviewed persons' point. To make the interviewee bring up what he or she think is relevant the interviews are semi-structured. This gives the interviewee the possibility to tell their version of the situation. The researcher is here given an opportunity to verify the answers (Denscombe, 2009).

2.4.5 Data collection in the thesis

In the study, the information that was collected was related to the ERP project and the procurement and supply chain processes. It was ensured to be relevant by not going too much into details to keep a holistic view and being up-to-date. The interviewed persons worked in the ERP project or with procurement activities, and were surely going to be affected by the change, see Appendix 1. Archival information such as presentations and plans were used to get the "official" information of the changes and challenges, see Appendix 3. The interviews gave a more descriptive view and information about perceived challenges and what was said in the organization could be collected, see Appendix 4.

The researchers have been visiting the company several times during the period of information collection. The study started with a pre-study at the company to get a grasp of the situation and how the project looked like. Short informal interviews were held in order to get a picture of the company and what the project was all about. In addition, interviews were made and archival data from the company was collected. This provided several sources of data and triangulation was possible.

2.4.5.1 Primary and secondary data

The primary data used, consisted of semi-structured interviews and short questionnaires handed out during the interviews. Another primary source was informal conversations with the persons working at the company. Documents, presentations, process maps and other material created for the project was a significant part of the primary data. The secondary data consisted of articles and books from reputable authors and international eminent magazine in the research area.

2.4.5.2 Archival data

In the study, the researchers had full access to the intranet, on which material could be found related to the project. The internal documents were collected by looking at the information in the intranet, where reports, presentations and process maps were studied. The documents were used to get a deeper understanding of the project, as well as to know the “official” version of what the project was supposed to accomplish and potential challenges. The business process maps were studied to see how the processes worked today and the complexity of the processes.

2.4.5.3 Questionnaire

In the thesis there were only a few persons involved in the data collection, which is not enough for a quantitative analysis. The questionnaires were intended to gather information from the persons during the interview and not used for statistical analysis. The case study can anyway benefit from a questionnaire by making the opinions from different persons easy to compare. The questionnaire had 30 statements, which the participant could grade from 1 to 5 on a Likert scale (strongly disagree, do not agree, neutral, agree and strongly agree). The questionnaire was based on the theory and pre-studies. The statements covered how the processes changed, statements about the organization and procurement, how the project will affect the supply chain and procurement as well as aspects of change management and possible challenges connected to the new system. Five challenges with the new project had to be ranked in terms of importance. It made it possible to see how the interviewee viewed different challenges in relation to each other. The challenges were selected

by looking at a risk report from MD, common challenges from the theory and perceived challenges from the pre-study. See Appendix 4. Since the challenges were used to compare the opinions between the actors it was not crucial to have the five most important challenges, more important to have five challenges that covered different areas.

2.4.5.4 Interviews

The main part of the data collection was made by semi-structured interviews in combination with a short questionnaire that the interviewed person had to fill in. In total thirteen persons were interviewed. These respondents were chosen because of their roles in the project and their knowledge concerning it. Their responsibilities and tasks within Maersk were also within the frame of our purpose and limitations that was set on forehand.

The persons we interviewed were (see Appendix 1):

- Maersk Drilling employees in the ERP project within Procurement and SCM track.
- Maersk Drilling employees from the procurement department
- Maersk Group Procurement employees, who knows the part of the process that is executed by Group Procurement.
- Consultant from the vendor who helped in designing the customized solution and fitting the processes with the system
- Consultant helping in the implementation

The wide variety of background of the interviewed persons gave perceptions from various positions, organizations and backgrounds. When the interviews were conducted, the interviewees first filled in the questionnaire and then they were interviewed under semi-structured forms.

The interviews were based on the theory framework and the pre-study interviews. The pre-study made sure that the interview questions were covering all the areas of interest. In the interviews, the interviewee first explained his/her role in the project and his/her professional background.

Then the procurement was discussed, what the new system would mean for the procurement activities, the procurement organization and changes in the organization and the role of master data. The processes were discussed, how they were changed and the expected results of the changes. Finally change management issues; such as support of the project, communication and resistance were discussed. The ERP system and its fit with the processes were discussed as well. Depending on the involvement of the persons the interviews had different focus (discussed more procurement with persons from procurement etc.), hence the semi-structured approach. Open questions were used to get the interviewed persons to explain and answer “Who”- and “Why”-questions. See Appendix 4.

2.5 Case study and thesis execution

The problem was first defined together with the supervisor from the company and the supervisor from the university. During the pre-study the company was visited several times and short unstructured interviews of 15 minutes were held to get an understanding of the project. Documents were studied as well during the pre-study. Then the problem was refined, it was an iterative process, see figure 4.

Pre-studies and theoretical studies was made to develop the problem definition together with Maersk. Studying theory and case designs developed the methodology. The theoretical framework was developed from the relevant literature that was studied and consisted of procurement and supply chain management, ERP systems and its implementation, knowledge about processes and change management. Based on the theory the questionnaire and the interview guide were developed. Interviews were held and archival data was collected. After that the analysis was conducted, comparing the data internally and with the theory. The empirical data was verified and finally the results were found. Then the conclusions from the whole study were drawn.

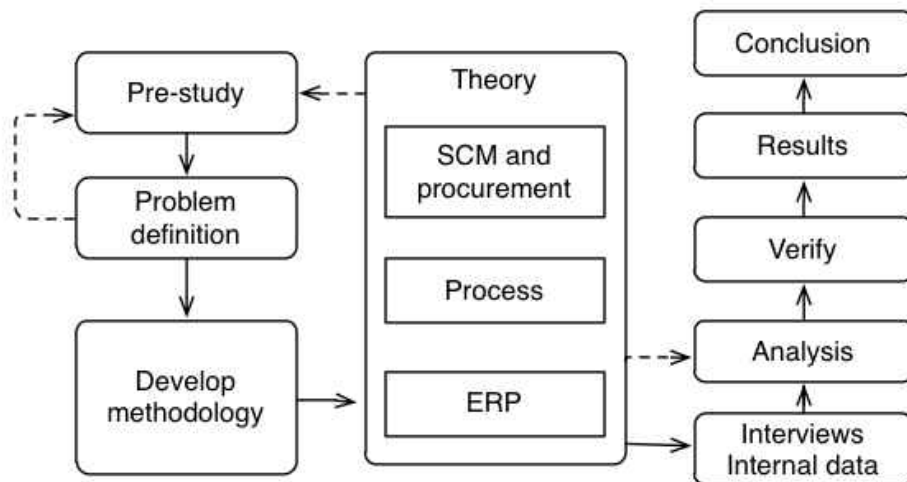


Figure 5 The model of how the thesis was executed

2.6 Analysis

Analyzing case studies can be difficult since the way of doing it is not well defined. Five techniques are commonly used (Yin, 2003):

- **Patterns matching** – A prediction prior to the data collection is compared with empirical patterns.
- **Explanation building** – The case study data is analyzed in order to build an explanation about the case. The explanation is built up by causal links, on how one phenomenon affects other parts. It is often iterative and starts with an initial case or presumption followed by studies of other cases and finally revising the statement.
- **Time-series analysis** – Common for single cases and is analyzing a case between two points in time.
- **Logic models** – Studies chain of events over a period of time.
- **Cross-case synthesis** – Compares multiple cases to make conclusions.

2.6.1.1 Pattern matching

According to Denscombe (2009) qualitative data can be coded and categorized. This can be used to identify common topics and relations between codes and categories. Finally the researcher develops general

statements based on the patterns and topics. Yin (2003) states that pattern matching can be used in descriptive studies to strengthen internal validity. The analysis starts with one or several propositions from the researcher with a depending variable. Then the variable either behaves as predicted and the proposition is correct or the variable is not predicted and the proposition has to be questioned. It is an iterative process and if there is only one case the same data has to be used to rule out arguments. If the proposition is questioned, a new variable is identified in order to show the proposition.

In simple pattern a minimal variety of dependent or independent variables can be used, but with few variables the patterns have to be more dramatic in order to allow comparison. With simple patterns no statistical criteria is relevant (Yin, 2003).

2.6.1.2 Time-series analysis

The main idea is to study a phenomenon or object in different points of time to identify trends. Chronologies are often used in case studies, tracing events over time. In a times-series study the events are carefully documented and investigated by an investigator (Yin 2003).

2.6.1.3 Qualitative data

Analyzing qualitative data is based on four guiding principles (Denscombe, 2009):

1. The analysis should be secured in data.
2. The explanation should come from a very careful reading of data. The explanation should be derived from a careful review of the empirical data.
3. The researcher should not put in unrelated prejudices into the analysis.
4. The analysis should be a repetitive process that compares empirical data.

2.6.2 Analysis in the thesis

The data collection was conducted over a period of totally three weeks (not including the pre-study). It can be seen as a single point in time,

however the processes had to be compared with what is currently used and the designs of the new processes. However, since the new processes designed for the new system was not implemented when the study was conducted only the planned changes could be studied, not the real effects. The findings were compared with archival data from the latest two years. The perceived challenges from the interviews were from a single point in time. Most of the study is in a single point in time, but some comparisons are made with archival material from other points in time.

2.6.2.1 Descriptive part

A descriptive framework can be used in a study where the study is a descriptive one (Yin 2003). The descriptive framework firstly describes the company and actors and then the current system and the changes that came with the new ERP system:

- 1) Actors and organization** - Describes the different actors in the company and how they work together. The relationships were important in order to understand the organizational aspect.
- 2) Current state** – Explains the current ERP system used and the problems that led to the decision to get a new system. Important in order to understand the changes.
- 3) Changes** – Describes the changes that come with the new system related to procurement and supply chain.
- 4) Challenges** – The perceived challenges were described by the different actors.

The empirical chapter is where the descriptive framework was used. The views of the different actors were presented (data from interviews) in the current state, the future state and in the challenge part. The archival data was used as well to describe the project and its expected effects.

2.6.2.2 Analysis and pattern matching

Simple pattern matching was used in the thesis to compare theory with the findings from the empirical data. Simple pattern matching was also used to compare the different sources of information with each other.

The study uses the approach by Denscombe (2009) in finding general conclusions, pattern matching. The data was coded and then topics and key concepts were identified from the interviews. The data was prioritized by looking at the theoretical framework in combination with the most frequent data (i.e. quotes and common opinions). The questionnaires were compared to see how the interviewed person perceived the challenges and changes. The goal was to identify differences and similarities that all agreed on. When those were identified it was compared with the internal data to see if they matched with the official information. The theory was compared with the findings in order to see how they fitted.

Then it was reduced into a few key topics and finally general statements were developed. It was an iterative process, which made the concepts gradually more clear. The analysis was verified and discussed with the interviewed persons to make sure that the discussing and reasoning was correct.

Then the materials were analyzed in order to see who put emphasis on what and draw conclusions. The general topics were connected to the theoretical framework:

- Supply Chain Management (focus on Procurement)
- Processes
- ERP (including implementation challenges)

Finally the sum of all parts was looked upon to see the overall picture.

The results were then identified and theory was used to find a way for MD to approach the biggest challenges identified. The analysis was made by looking at what approaches that were used in similar cases. Respected authors recommendations for how to handle challenges in an ERP implementation and process changes were taken into account. Finally the conclusions were made and presented in an easy format for the company.

Since it was a qualitative study, the researchers were involved in the analysis and data collection, and the researcher's views might have affected the results to some degree.

2.7 Credibility

Since the thesis is based on mainly interviews and observations and not measurable facts it is important that the researchers gets results that are trustworthy as it otherwise leads to limited applicability for other studies. This is an important aspect since it helps in examining the quality of the study and ensures that the conclusions are well founded. There are different categorizations of these aspects but the two most common ones are validity and reliability (Yin, 2003).

2.7.1 Validity

Validity is to which extent one studies what one intends to study. It therefore depends on how strong the link is between the object that is to be examined and what is actually examined (Höst et al., 2006). Several types of validity exists (Yin, 2003):

2.7.1.1 Internal validity

This is used only for explanatory and causal studies. It shows that one condition leads to another condition. It can be handled in the data analysis by pattern-matching, explanation building, looking at rival explanations or use logic models and is also called logical validity (Yin, 2003). An issue here is whether the researcher provides plausible causal argument and logical reasoning to defend the research conclusion (Gibbert et al., 2008).

2.7.1.2 Construct validity

Construct validity is about establishing the correct operational measures. That the changes studied are changes that is supposed to be studied. The potential risks in this are the subjective experience and views of the researchers. This needs to be considered during the data collection phase and a tactic can be to use multiple sources of evidence such as multiple respondents for interviews, archival data from different sources, different evaluators of the material or different theories on the same subject (Yin, 2003). This way of finding convergent patterns between different sources is also known as *triangulation* and is used to secure that the data is correct. This leads to a study that becomes more convincing and accurate. The weakness is that the researcher must master several data collection

methods and that the conclusions might diverge (Yin, 2003). Letting key informants review the draft report and verify the facts can also increase construct validity. Furthermore it can be strengthened by establishing a chain of evidence, which refers to how well the reader can follow the logic and reasoning in the investigation (Yin, 2003). By doing this the subjective judgments from the researchers can be avoided and increase the validity (Gibbert et al., 2008).

2.7.1.3 External validity

External validity is about showing that the findings are generalizable beyond the study. Single case studies are generally considered to be poor in this regard. Theory can be used in single case studies, and replication in multiple case studies (Yin, 2003).

2.7.2 Reliability

A good reliability means that the result will be the same on repeated studies regardless of who is doing the studies. It implies being thorough in the data collection phase and in reporting the methodology in order for readers to assess the approach of the study (Höst et al., 2006).

2.7.3 Credibility of the thesis

In the thesis the credibility was secured by extensive data collection from several sources and by using scientific methods.

2.7.3.1 Internal validity

In our study the internal validity can be affected because the respondents are not working closely to the operational part, the rigs. They can therefore have a different view on the challenges or in which way the processes will actually change. There is also a possibility that they have been previously informed about the challenges that lay ahead, which makes them influenced and therefore reflects their answers. In order to increase the internal validity we have therefore interviewed regular staff from the rigs that now are included in the ERP project but the risk of them being affected by others opinions in the ERP project is still there.

2.7.3.2 Construct validity

To increase the construct validity, information was collected from the internal database where presentations, memos, newsletters and other documents were stored. Letting the respondents from the interviews verify the empirical draft before continuing with the analysis also validated the information from the interviews.

2.7.3.3 External validity

In the research this was mainly secured through theoretical studies since the nature of the study intended to give a deep description, making it less generalizable.

2.7.3.4 Reliability

Reliability was reached in the study by a detailed methodology and making sure that all relevant data was used from the company. Internal databases were searched for data linked to the ERP project, processes, procurement and supply chain management. Concerning the interviews the reliability can be affected in terms of the respondents' daily form and their knowledge about the questions asked during the interviews. These interviews were performed in a way that we, in case of risk of misinterpretation, asked follow-up questions and clarifications. With regards to the questionnaire we could make sure that the persons answered the same questions and if the respondent could not give an answer the question was left blank. During the study a protocol was used to see the procedure used. All interview questions and questionnaires are attached, see Appendix 4 and 5. The internal data is easy to reuse, but time has probably affected the perceptions of the interviewed persons. To minimize the risk of subjective input from the researchers the results from the interviews was analyzed shortly after the time of the interview. As an aid the researchers used a recorder during the interviews, which gave the possibility to go through the interviews again in order to reassure what was said.

3 Frame of reference

The theoretical framework describes the Supply Chain and purchasing processes. Secondly processes will be described followed by ERP systems and its implementation challenges, which involves change management that is required in order to achieve a successful transformation.

The reasoning when setting the theoretical framework was that the ERP project is the start of a radical change in the way of working at MD (see figure 5). Many processes are redesigned or improved to become more simple, efficient, cross-functional and uniform to support the strategy. The processes will be more integrated and the information more transparent throughout the process chains (Project Introduction). In order to support such a change, tools from change management comes in handy. The whole study is within the procurement and supply chain area.

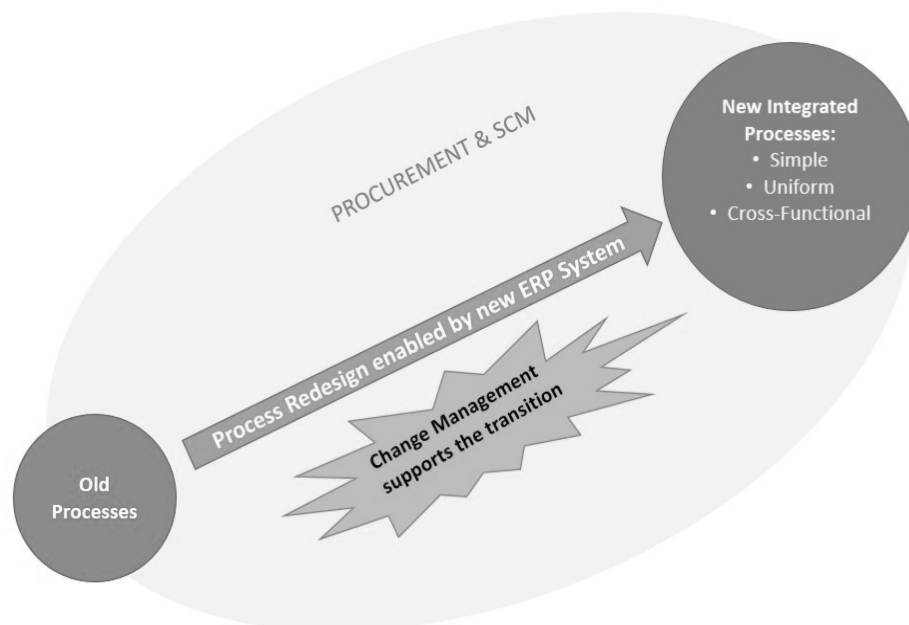


Figure 6 Illustration of the reasoning when setting the theoretical framework

With this illustration as a starting point we then set up the structure for the theoretical framework containing the four areas; Procurement and SCM, ERP, Processes and Change management. In figure 6 an overview of the

theory chapter can be seen which can help in getting an overview of the different areas.

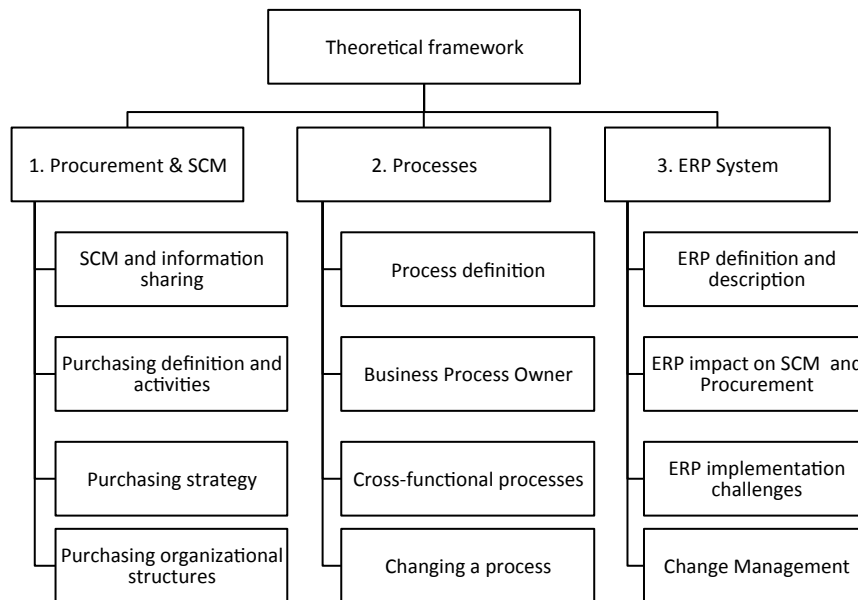


Figure 7 Theoretical framework

3.1 Supply chain management

In the study the purchasing processes are closely connected with logistics and supply chain. The ERP system, which will be discussed later, plays a significant role in the transactional work of logistics, hence the relevance of supply chain theory. A big factor in the study is information sharing and transparency related to supply chain activities, on which the focus of the theory is.

The ultimate goals for the supply chain are to deliver lower costs, customer satisfaction and a competitive advantage. In the supply chain there are flows of products according to Mentzer et al., (2001); services, information and financial resources. The customers have a demand and the supply chain tries to forecast the demand. It is a global setting for most of the supply chains today. In the supply chain there are several activities that need to be coordinated: marketing, sales, research and development, forecasting, production, purchasing, logistics, information systems, finance

and customer service. In order to have a good coordination there needs to be trust, commitment, a sound risk dependence and organizational compatibility. There are typical business functions such as planning, organization and business processes. They have to be inter-coordinated for the supply chain to reach its full potential, (Mentzer et al., 2001), see figure 7.

The direct supply chain deals with the focal company and its supplier and customer. For an even bigger picture it is possible to zoom out and look at the customer's customer etc. (Mentzer et al., 2001).

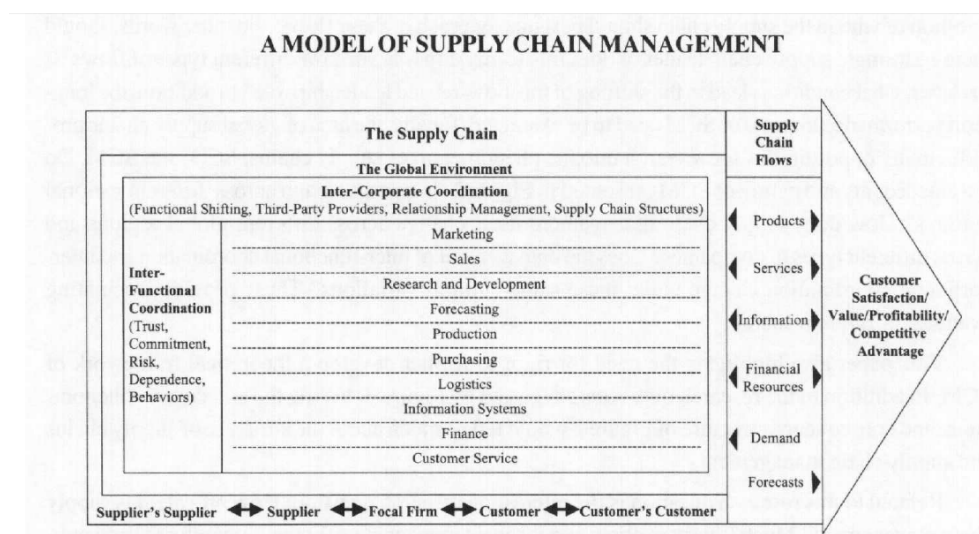


Figure 8 The supply chain model by Mentzer et al., 2001

Another established model of the supply chain and managing the supply chain is Lambert's (2001) model. The model gives a clear view of the functional silos across the supply chain and inside the focal company. There are several key business processes across the supply chain, and supply chain management is all about integrating and managing the key activities across the supply chain. The key activities are seen in figure 8, and are product flow, customer service management, demand management, order fulfillment, manufacturing flow management, procurement, product development and returns. In the early history of SCM, the confusion between logistics and SCM was common. Logistics is a part of SCM that plans, implements and controls the flow and storage of goods and

information from the origin to the point of consumption. This distinction between logistics and SCM is the one used in the thesis.

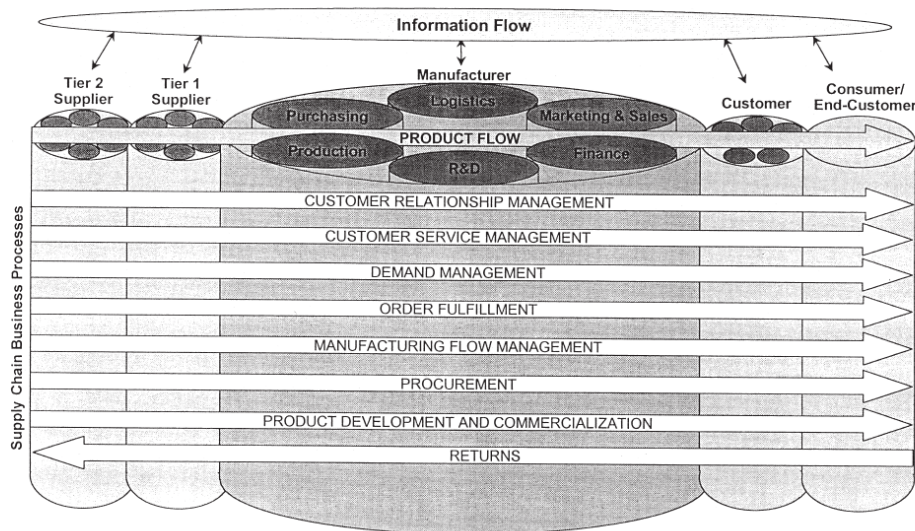


Figure 9 Lambert's (2001) model of the supply chain and the interactions

3.1.1.1 Comparison and the choice for Mentzer's model for SCM

In the study, Mentzer's model was chosen for the analysis. The model by Mentzer et al. emphasizes the interfunctional coordination more than Lambert's model. That was important since the study was mostly concerning the internal activities of MD, since the suppliers and customers of MD were not affected to a great extent by the new ERP system. Mentzer's model made a better fit with the study since it was easy to focus on the areas that were studied closely such as purchasing, logistics and information systems. In Lambert's model the fit is not as good since information is more holistic and information system is not a part of the model, but a crucial part of the study.

3.1.1.2 Information sharing in a supply chain

A key driver for supply chain management is cost-effective IT-systems, including ERP. The most commonly shared information is inventory, to manage the inventory between two sites (Lee et al., 1998).

In a typical supply chain with independent companies and functions, it can be hard to trace the order or know who is involved. By sharing order status and letting the customer do a “one stop inquiry” it is much easier for the customer to know the status instead of several phone calls (Lee et al., 1998).

3.1.2 Inventory

The inventory consists of all material used for creating a product or service, in the process going from an input to an output. The management of the inventory is a key activity; it is a large financial investment, provides the operations with needed material and helps satisfying the customer. The inventory level is depending on the supply of material and the demand from customers. Buffer inventory is used when the demand is uncertain. By reducing the inventory level cash can be freed to use in other places in the company. The reorder level is the level of stock when it is time to place a new order for those particular goods. The company can use inventory control systems to keep track of and manage the inventory as well as planning the need of goods (Hill & Hill, 2011).

3.1.3 Purchasing

Purchasing is “The management of the company’s external resources in such a way that the supply of all goods, services, capabilities and knowledge which are necessary for running, maintaining and managing the company’s primary and support activities is secured under the most favorable conditions” (van Weele, 2012, p3). The role of the purchasing function is to make sure that the company gets the inputs needed for the firms’ value chain. It also includes the activities required to get the product or service delivered to the company from the supplier (van Weele, 2012, p6).

The activities that the purchasing function is doing are represented in the purchasing process (van Weele, 2012) that contains of six steps, see figure 9:

Setting the specifications: Getting the needs and requirements from the user, what the service or product is used for and the technical specifications, and any documentation that is needed.

Selecting the best suppliers possible: Assuring that the best possible supplier is selected by sending out requests for quotations or tenders where the buyer ask for bids to qualified suppliers.

Contract agreement: Includes preparing the contract, deciding the type of contract, penalty clauses, payment, price and prepare the negotiation in order to end up with a negotiated agreement.

Ordering: Placing the orders to the supplier and developing the routines for this to make them efficient. It can be different routines depending on how complex the product is, and it is also important to decide how to communicate.

Expediting: Monitoring and controlling the order of the supplier to secure supply, check invoices and develop an expediting routine. Acceptance tests can be used to check the quality of the equipment, and it needs to be decided where it is done.

Evaluation: Assessing and checking the performance of the suppliers to be able to rate them. The information can be used for future supplier selection and make sure that the company works with suppliers with proven capabilities.

When a purchase is made, a purchase order is created, when the goods is delivered there has to be a delivery note, and in order for the supplier is paid an invoice is created. These all are transaction costs, which arise when something is exchanged between two parties. The transaction cost depends on the frequency, the level of transaction-specific investment and the level of uncertainty (van Weele, 2012).

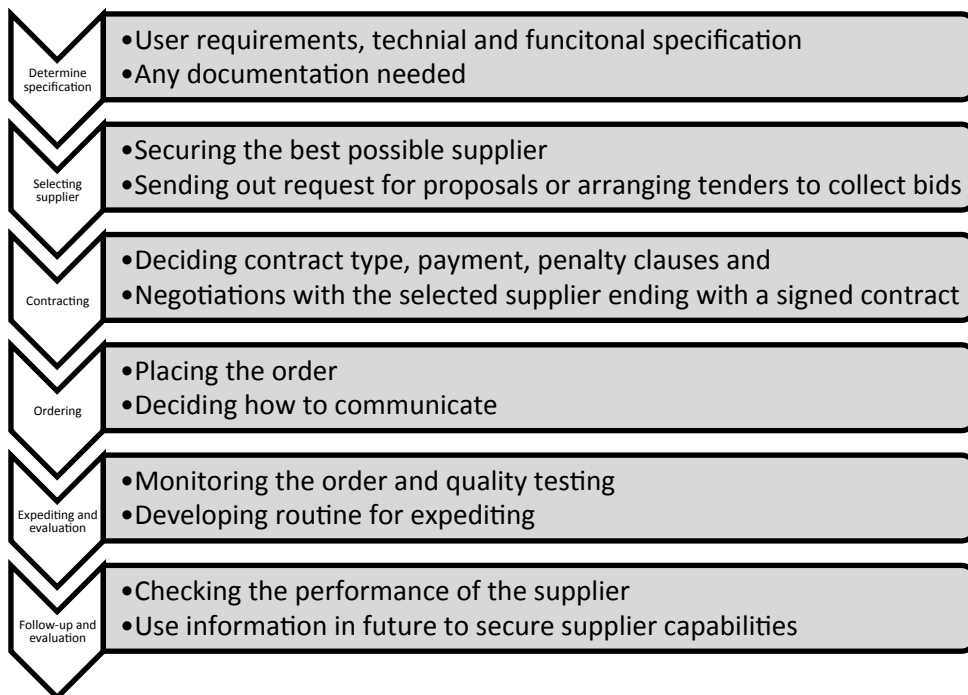


Figure 10 The purchasing process model according to van Weele, 2012, p9. The steps and activities in order to purchase an item.

3.1.4 Purchasing organization structure

ERP systems are closely connected with the organization and the way of working. Typical ERP benefits are streamlining business processes, process transparency and lower administrative costs (Velcu 2007). These factors are important in purchasing and the organizational structure of the purchasing function is important to have in mind when changing an ERP system to realize the full benefits. Changing the business processes to improve the performance is connected to management, IT, people and organizational structure (Velcu, 2007). The ERP system has a strong impact on who does what in the purchasing process, the system decides who should enter what data and the visibility of data between departments. The purchasing department might have use for operational information in order to improve purchase planning. The purchasing organization is important to consider, since a new ERP system can contribute to a more decentralized decision-making (Velcu, 2007).

3.1.4.1 Centralization

According to Glock and Hochrein (2011) the level of centralization can be defined as the level of aggregation of decision-making authority that is put into a central single organizational unit. It measures how much of the purchasing authority that is aggregated in a unit, which for example can be a central purchasing department.

The level of centralization and decentralization of the purchasing function is a traditional debate. Centralization brings the benefits of standardization of products and processes, cost reductions through economies of scale and improved expertise and knowledge of the staff (Droge & Germain, 1989). Decentralization on the other hand brings the benefits of improved service, lower costs by having the decision-making closer to the end user, which also means increased opportunities to manage the total cost of ownership for the end user. Some level of centralization is usually needed to support strategic changes by the organization (Johnson et al., 2004).

Glock and Hochrein (2011) did an extensive literature review where they found that the purchasing organization is important for the success of the firm. A company oriented towards a cost strategy should have a central purchasing function and companies that use a differentiation strategy should have de-centralized supply function. The right purchasing strategy will give returns in higher inventory turnover and higher return on assets. The ERP system can be seen as a tool to help realize the purchasing strategy and also affect the centralization of the purchasing department.

3.1.5 Alternative theories in Purchasing

The general model made by Webster and Wind (1972) is a general model to describe the organizational buying behavior. With organizations companies and institutions are considered.

The model has four steps until a buying decision is made:

1. **The environment:** External factors as culture, economic factors, political, legal and more. These factors together determine the available information about suppliers, the availability of goods and

services, general business conditions that guides the buyers and sellers in the market.

2. **The organization:** The organization that is buying has an organizational technology, structure, goals and tasks, actors which all affect the buying center. Communication and incentive systems as well as internal status in the organization are all affecting the buying center in some aspect.
3. **The buying center:** The buying center is the part of the organization that buys the goods. In the buying center there are users who use the goods, buyers with formal responsibility to contract suppliers, influencers who influence the decision, deciders with high authority and gatekeepers who control information flow. The relationship and interaction between these roles and the organizational lead to the unique buying decision.
4. **Individual participants:** Finally it is an individual who analyzes and makes the purchasing decision. The individual motivation is affected by a combination of personal and organization factors.
5. **The buying decision:** All in all these are factors that affect the decision, both the individual decision and the group decision, which is finally made on what to buy.

3.1.5.1 Choosing van Weele's model

As seen the model is more about how the purchase decision is made than the actual purchasing process. Van Weele's model fits better since it focuses on the different steps in the process of purchasing, which was neater since the study is about how the processes are changing, not the buying behavior. The process focus of the study makes a good fit with the van Weele model since the different processes can be separated and studied before and after the new system. It was more natural to use when analyzing the changes of the purchasing process. The Webster and Wind model is very difficult to use for a process analysis, since it is heavily focused towards soft factors and how the purchasing decision is made. The decision of the purchase played a very small role in the thesis, since the whole process was studied. The organizational aspect of the model could be relevant, but the Webster and Wind model is very general and too focused

behavior and relationships to fit with the study. Thereby it is not considered as good a fit as van Weele for the study. Van Weele's model gives a very clear structure and makes a more natural fit with the scope of the study.

3.2 Processes

Processes deal with creating value to satisfy the customer by increasing the effectiveness and using the resources and competence of an organization in the best possible way. According to Ljungberg and Larsson (2012, p 60), a process is a network of linked activities, that are repetitively used, which uses information and resources to create value to satisfy a given need. A process starts with a customer need and finishes when the need is satisfied. The customer can be internal or external. The components of a process are "object in", "activity", "resource", "information" and "object out", see figure 10. The object that comes in initiates the process. The object out is the result of the transformation in the meeting between an activity and resources. The process is made from a network of activities that uses resources. The information is supporting the process (Ljungberg & Larsson, 2012).

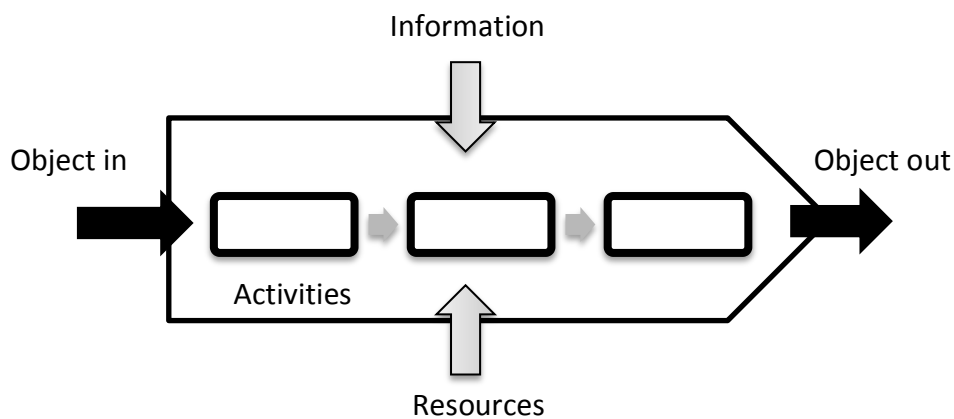


Figure 11 The components of a process according to Ljungberg & Larsson (2012)

In the thesis *business processes* are the processes related to the business with a stakeholder initiating the process, and the process is not complete until the stakeholder is satisfied (Burlton, 2001). The *system processes* are processes related to activities and the order of execution in the ERP system in the thesis. When talking about the strategic fit of an ERP implementation it is the gap between the system processes and business processes that is referred to.

A core process serves the external customers and is long in general. A support process helps the core process, and is generally shorter than the core process. The core process cannot be completed without the support process. An indirectly supporting process is called an administrative process. (Aggarwal & Jong-Sung, 2009)

According to Hammer (2007) a process need to have a well-specified design so people know what to do. The performers who execute the process must have the right competencies and skills in order to implement the design. The owner of the process makes sure that the process delivers (see 3.2.2 “BPO”), and the company also needs to align its infrastructure such as the information systems and the human resources systems to support the process. The right metrics needs to be used in order to set the performance of the process. All in all these are enablers for a high performance process.

Furthermore Hammer (2007) states that companies can have different levels of maturity related to processes. In an immature company the people are merely aware of processes and metrics. In a more mature company people can describe the process and fit themselves in it. If the company is further mature, the employees can say how their efforts affect the company performance. In very mature companies the employees can say how they affect the customers and suppliers. In more mature companies it is easier to do changes to processes.

3.2.1 Systems view and its connection to processes

Many processes together are often part of a system. A holistic view is important when using a process perspective and several processes can be linked inside a system (Ljungberg & Larsson, 2012).

Taking a systems view in processes means a wider picture, not only *how* but also *by who* and *what* is a part of the process. A risk is losing the process view and going into complex models (Rentzhog, 1998). In the thesis the processes will be viewed as a chain of activities as earlier stated and the details will not be studied. The systems view will only be applicable on high level when discussing perceptions of the different actors (see more under 2.1.2 “Systems approach”).

3.2.2 Business process owner

A process owner is important to oversee a cross-functional process, and keep improving the process (Rummler & Brache, 1991). If there is no process owner with clear ownership, then the functional structure will continue to dominate. The ownership should be created as an infrastructure for the process management, and then the structure can be added to the existing one. The result is a more process-oriented organization (Rentzhog, 1998). The people who work with the process should own it; otherwise there is a higher risk of failure. It is important that initiatives to change business processes comes from top management (Caron et al., 1994). The major difference in a process-driven company is that the functions are measured on how much they contribute to one or more processes, hence higher customer focus (Rummler & Brache, 1991). The process owner often has to be good at handling conflicts since the process often goes across several departments with various interests. When the process-oriented way of looking at the organization gets more accepted, and then the organization need to be further adapted in order to support the process orientation. Adaption related to incentives, management, routines, rules and more (Rentzhog, 1998). The owner should also have a major stake in the process, much to win if it succeeds and much to loose if it fails, this to handle the pivotal nature of the role,

and have a good overview of the process and its impacts on the business (Rummler & Brache, 1991).

3.2.3 Cross-functional processes

It can be a challenge to move from a hierarchical structure to a process structure in a company since several business processes might have to move at the same time. A business process redesign is often a major change, which cuts across functional boundaries (van Ackere et al., 1993). Typically very strong support is required from top management. Instead of having a “process only” view of the organization it can be a mix of process oriented and function approach. Then process owners have a cross-functional responsibility and works with process improvement and the functional staff handles the day-to-day control (Burlton 2001, p 89). Usually there are no problems with conflicts between process owners and functional managers. Some possible explanations are that the process owners do not have the authority to change anything within the function, the processes are defined from a functional perspective or that the problems do not arise until the process way of working is in a continuous phase (Rentzhog, 1998).

Information processing tools can help in the planning process for the decision maker to focus on the essentials of the decision. Here it is important that the organization coordinate such decisions, by using tools such as policies, teams, matrix structures etc. (Persson, 1995). The information systems must support cross-functional processes rather than only focusing at departments (Hammer, 2007).

3.2.4 Changing a process

Changing a process can be necessary in order to make it perform better. The process can be improved continuously, or if it is a more drastic change, it can be redesigned or reengineered (Davenport, 1998). The similarities are that the process is the main unit. The main differences are that redesign requires radical enhancement where an improvement can be 10% improved result. A form of improvement is the process value analysis. The activities are then classified into three categories, value adding, non-value

adding and waste. A value adding activity contributes directly to satisfying the customer need. A non-value added activity is an activity that is needed for the process but is not adding value to the customer directly. Usually this is an internal activity. Waste is an activity that does not create value either internally or for the customer (Ljungberg & Larsson, 2012).

The redesign instead starts from a clean sheet while an improvement starts from the current state (Davenport, 1998). Implementing reengineered processes is complex and involves several factors (Grover et al., 1995). The organization has to be prepared to develop learning capabilities and learn from successes and failures to reap the rewards from process reengineering (Caron et al., 1994).

In a logistics perspective redesigning a logistics process can reduce the cycle time significantly. With cycle time or lead-time it is referred to the time from when a need is identified until it is met. It is not unusual that 95% - 99,9% of the time is non-active in a logistics process. Goals like reducing cycle time 50%, forces the company to think of completely new ways of working, and longer lead-times from the supplier often means more waste for the customer (Persson, 1995).

Radical changes are tough to achieve since it is not just make a new workflow. A new process means as well redefining jobs more broadly and support training for those jobs, make reward systems that focus on the processes and the process outcomes. In addition, the culture at the company needs to emphasize teamwork and focus on the customer (Hammer, 2007).

The complexity in a logistic process is often driven by the number of decision elements. Factors that affect complexity are number of items registered, product range, levels in supply systems, persons involved etc. Reduced complexity, which can be attained from process redesigning, normally leads to reduced stock levels and reduced time waste (Persson, 1995).

The greatest opportunities for improvement often lay in the functional interfaces, where the object is passed on from one function to another

(Rummler & Brache, 1991). Every time the object is transferred, it means a delay and a risk of misunderstanding. A responsibility analysis can be made to define what roles and responsibilities a person has in a process, to see if the person or handover really is needed (Ljungberg & Larsson, 2012).

Reengineering a process is complex and involves many factors. IT is a typical enabler for process reengineering. Potential problems can be management support problems, technological competence problems, process delineation problems, project planning, change management problems and project management problems (Grover et al., 1995).

3.3 Enterprise resource planning (ERP)

An ERP is an integrated information system that spans across the organization and a powerful tool to change, integrate and automate business and system processes. As today's companies are faced with increasing competition, global expansion and rising customer expectations a key driver for supply chain management is cost-effective ERP systems. Lowering costs while increasing efficiency is essential to remain competitive. To accomplish these objectives, companies seeks for solutions that can help and this is where an ERP system comes in (Umble & Umble, 2003). Thereby it helps business processes to be more flexible and responsive (Chuang & Shaw, 2008). It does this by enabling companies to monitor the internal business processes such as manufacturing, logistics, distribution, accounting, finance and human resources of a company as seen in the following model (Davenport, 1998).

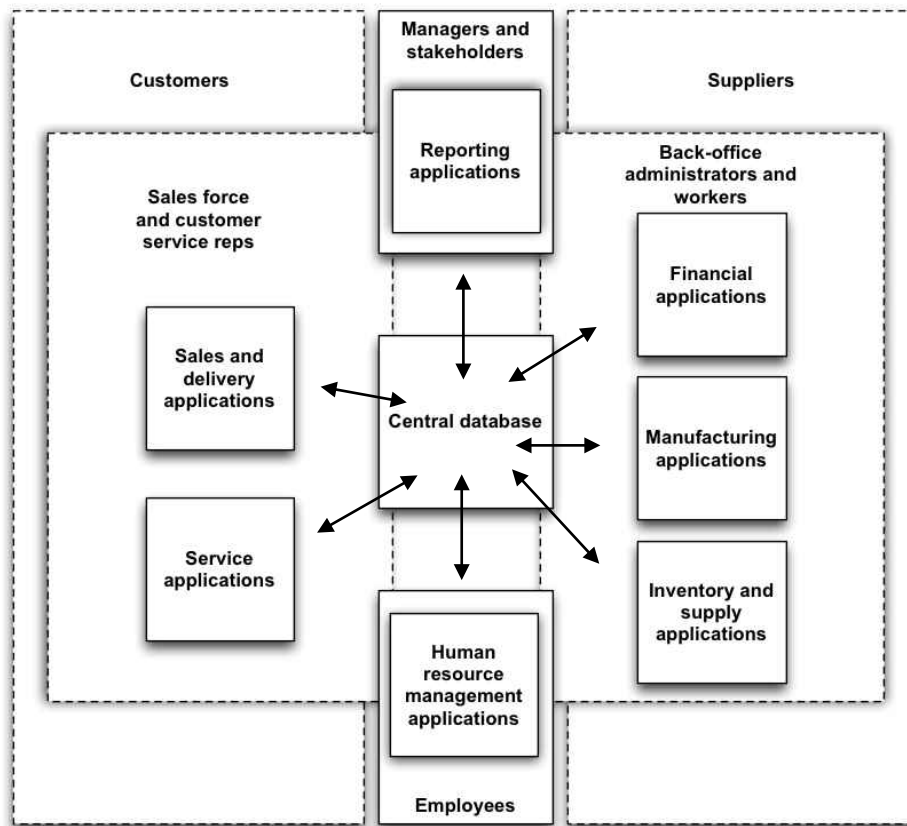


Figure 12 Davenports (1998) model over the ERP system

ERP combines them all together into an integrated software program that runs off a database so that the various departments can more easily share information and communicate with each other (Bidgoli, 2008). As seen in figure 11 it may also integrate customers and suppliers as a part of the ERP.

Nah et al. (2001) say that the most important attributes of an ERP system are the abilities to:

- Automate and integrate organization’s business processes
- Share common data and practices across the entire enterprise
- Produce and access information in a real-time environment

There is no doubt that ERP system brings potential benefits as it can improve processes, decrease costs and provide integration to form a

whole, which is advantageous and desirable for most organizations. ERP systems can also reduce business risks and enhance the overall organization business performance (Singla, 2008).

3.3.1 ERP impact on Procurement and SCM

The benefits from using an ERP system related to purchasing and supply chain can be:

- Lower inventory (Damijan et al., 2009; Velcu, 2007).
- Higher inventory turnover (Velcu 2007).
- Decreased order lead-time (Hendricks et al., 2001).
- Reduced working capital (Damijan et al., 2009).
- Planning is based on the same real-time data (Hendrick et al., 2001; Velcu 2007).
- Transparency in business processes and enhanced process management (Velcu 2007).
- More accurate invoices (Velcu, 2007).
- Improved customer service (Velcu 2007; Hendricks et al., 2001).
- Lower administration costs (Velcu, 2007).
- Higher data quality (Gattiker & Goodhue, 2005).
- More detailed supplier performance evaluation (LaFramboise & Reyes, 2005).
- On-time shipment (Leon, 1999).

The benefits are however generated first when the utilization improves, and that is why end user attitude is key (Velcu, 2007). Naturally it takes some time to learn the new system and achieve the full benefits and in the beginning there is a higher risk of user errors due to lack of experience and training.

In a study by Hendrick et al. (2006) the corporate impact of SCM, CRM and ERP systems was investigated on a total sample of 406 firms. It was found that although enterprise systems comes with a high implementation cost, and not always contribute uniformly to better results, they did not find

persistent evidence of negative performance associated with enterprise systems.

3.3.2 ERP implementation

Implementing a new ERP system into a company is a major undertaking and installing them entails not only technical challenges but also organizational and people challenges. It will eventually affect the organizational structure, culture and strategy, which require adaptation and change management (Aladwani, 2001).

The implementation often follows a set of phases and these are described both in holistic views and in more detailed views. One that has a more holistic view and shortly describes the phases of an ERP implementation is the following (Sandoe, 2001), see figure 12 on the next page.

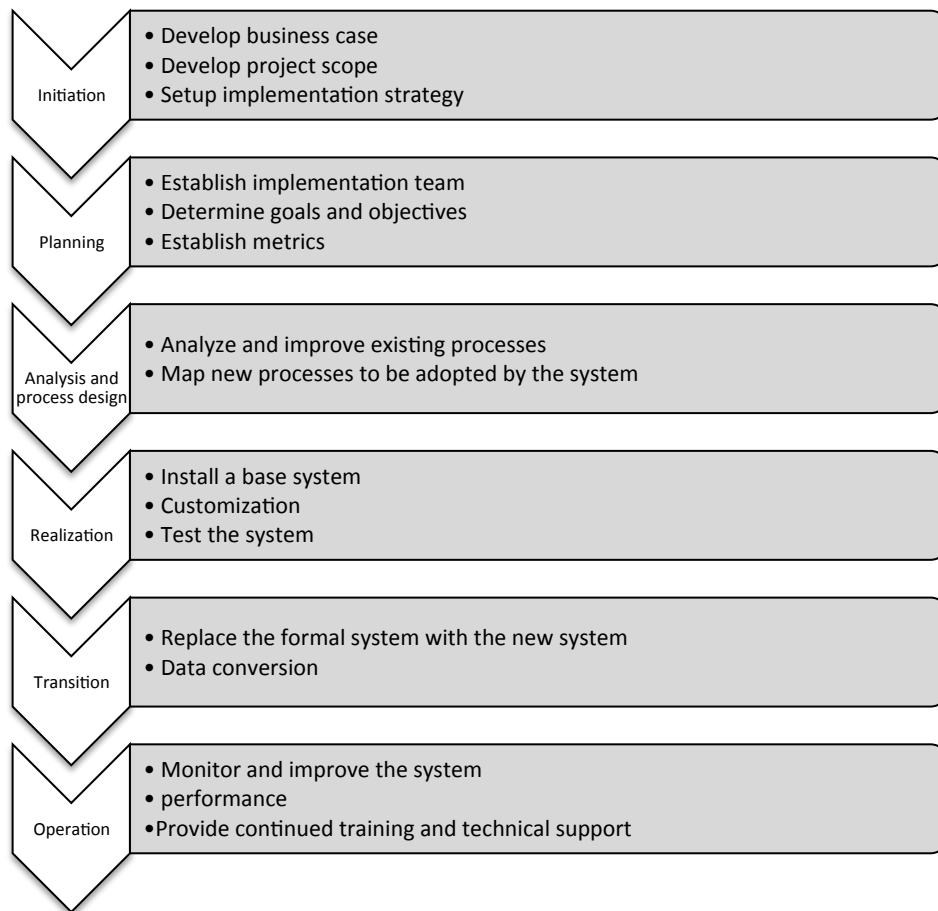


Figure 13 Sandoe's (2001) model over the phases in an ERP implementation

These are the most significant phases and this is intended to give the reader a quick view of the different phases in an ERP implementation.

The implementation process can last from six months up to several years, and eventually it will affect everyone in the company (Vilpola, 2008). Yan et al. showed in 2009 that it could take four to five years after implementing an ERP system until the efficiency and profitability increased of the business processes.

The implementation can also be done in different ways with regards to the planning of the actual implementation. It can be implemented incrementally or in a big bang where the ERP system is installed parallel and simultaneously across the entire organization (Davenport, 2000).

After the implementation the company should be more process-oriented to get the full benefits of the system (Aggarwal & Jong-Sung, 2009). For the strategic processes the change can either increase or decrease alignment between the business process and the strategy. Changes made to non-strategic processes are less likely to have any effect on the business (Gattiker & Goodhue, 2002).

3.3.3 Challenges during an ERP implementation

An ERP system appears to be a dream come true but the complexity often leads to failures. Challenges in the ERP implementation are related to the critical success factors and how these are conducted. Many project managers consider ERP implementation as a challenge as it concerns systems (technology, software, hardware), people (project structure, change management) and processes (adaptation and customization to ERP), (Wong et al., 2005). Nah et al. (2002) have also researched numerous articles and identified critical success factors in implementing ERP systems. Here the challenges connected to processes, systems and people, will be described.

3.3.3.1 BPR and minimum customization

It is almost inevitable to change processes when implementing an ERP system (Bingi et al., 1999). Typically a business process is supported by an ERP system that represents business functions and in an implementation it is important to begin with well-defined processes (Aggarwal & Jong-Sung, 2009). The ERP system can then be built as tailored software but it is an unrealistic approach because of extensive costs. Instead companies buy commercial-off-the-shelf solutions and then customize them in order to fit with the actual needs and activities (Rashid et al., 2002). However, if a company is using a generic process approach when the business requires customized processes it can take away the competitive advantage. An ERP system is, after all, a generic solution based on the observations from a wide variety of firms and how they operate in general (Gattiker & Goodhue, 2002). As a result of this, most companies need to adapt or even rework their processes in order to fit the ERP system (Davenport, 1997).

“The logic of the system may conflict with the logic of the business.” - Davenport, 1997

It is therefore important to have a strategic fit between the ERP and the current processes of the business. This strategic fit is often not perfect as ERP does not provide models for every process of every industry and therefore changes needs to be done. An unsuccessful fit between the business processes and the system can result in not utilizing the system fully, and if the strategy and system not is coordinated, it can have a negative impact on system functionality (Velcu, 2007).

The ERP vendor can also learn from unique organizations which in a help in developing new standard modules. In those cases requirement analysis is important. This was shown in a study by Pollock (2004) where an ERP vendor developed new functions based on the learnings from ERP installation and development at a university.

3.3.3.2 Software development, testing and troubleshooting

It is essential for the development and testing that the architecture is well designed and managed. The general architecture should be determined. This involves using appropriate modeling methods and tools that will aid in the ERP implementation. Requirement definition should be created and troubleshooting of errors is critical (Holland et al., 1999). There should also be a plan on how to migrate and clean up the master data (Rosario, 2000). The master data is considered as the core information and can be referred to as the “system of records” (Griffin, 2006). This information needs to be complete, correct and up-to-date in order to be able to use its full advantages. It often contains information about a certain product, such as weight, color, material, price, article-number, manufacturer, supplier etc. (Griffin, 2006). Advantages with master data that is of high quality is according to Loser (2006):

- Improved communication and more effective collaboration with external parties such as the manufacturer or supplier.
- Improved business processes, which result in an increase in productivity, i.e. it takes less time to create master data.

- Correct decision-making.
- Improved reports that policy makers can rely on.
- Lower costs.
- Improved competitive advantage.

Errors in master data can be costly for companies, irritate customers and make introduction of new strategies difficult to implement or simply impossible. If companies do not take advantage of their decision support systems, the companies cannot quite get the upper hand over the master data and can thus losing its competitive edge against those companies that are better at this (Loser, 2006).

3.3.3.3 Change management program and culture

Often companies are good at identifying needs to change but the knowledge of the need alone is not sufficient. The capacity and willingness of the organization to adapt to external and internal changes will affect the outcome (Jacobsen, 2005). Corporate culture, poor leadership and lack of teamwork are all factors that impede change (Kotter, 1996).

“It is often said that ERP implementation is about people, not processes or technology.” - Bingi et al., 1999

A successful implementation must be managed as a program of change initiatives that needs to be performed across the organization (Hong & Kim, 2011). When implementing a new ERP system the sources and types of resistance to change are many and Aladwani uses a framework where he mentions two fundamental sources; perceived risks and habit. When talking about perceived risks he means the individual perception of a risk that is associated with the decision to implement for an example an ERP system. Habits refer to a person’s current way of practice and the routines that one is doing.

Top management support

For top management the people aspects are important factors that need to be considered when setting the plan of an ERP implementation. A successful implementation requires good leadership and commitment by top management (Umble & Umble, 2002). Having the commitment from

top management also results in commitment from the employees and is a key success factor in any ERP implementation (Nah et al., 2002). Making the employees involved, attending their concerns and making available support groups will reduce the risk of resistance. By having early user involvement in the design and implementation of the new business processes and using a top-down and cross-functional communication it can instead generate enthusiasm for the ERP and enhance the success of the implementation (Stratman & Roth, 2002).

8-step change model

In order to achieve a desired future state a set of tools, mechanisms, and processes can be used. Several of these tools and models exist and one of the most known is the 8-step change model developed by John Kotter who is a professor at Harvard Business School. The 8-step change model is a powerful method to effective change strategies and processes (Kotter, 1996), see figure 13.

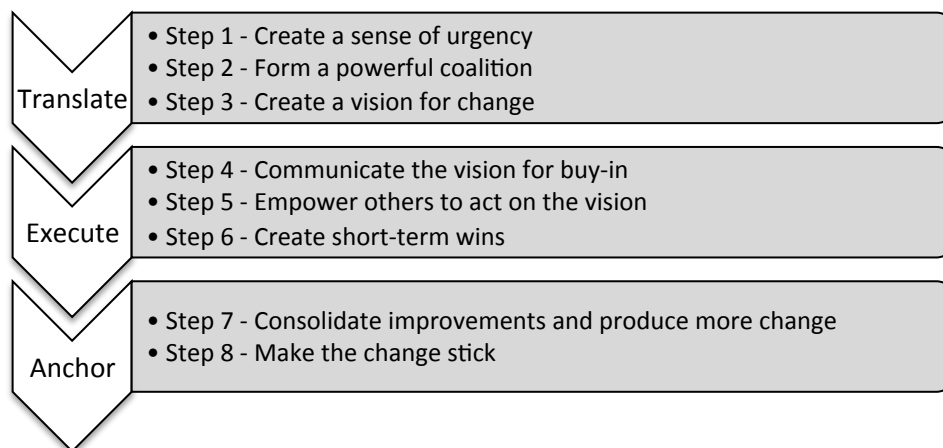


Figure 14 Kotter's 8-step change model

Create a sense of urgency

In order to mobilize the staff and get the needed cooperation for change it is important to get a sense of urgency. This feeling will result in and ensure that the motivation and acceptance for change is established among the staff. If this is not achieved the momentum for change will not occur and the project will fall far from the finish line. This can be done by showing for

example financial losses, setting high targets or inform about potential problems. Doing this can help in spreading the feeling of importance throughout the company to enable the change (Kotter, 1996).

Form a powerful coalition

Putting together a group of “the right people” with mutual trust and a common goal is essential in order to implement and establish a change initiative. The coalition must have the right composition, with members from various departments, in order to reach out to the whole business and convince them that change is necessary. The characteristics needed for this coalition is that they are leaders and key players who possess the expertise needed in order to attain the credibility among the staff. Kotter stresses the importance of leadership in change management. If a guiding coalition only contains good managers but not good leaders the project will not succeed. A managerial mindset can develop plans but lacks the ability to communicate the vision and direction of change (Kotter, 1996).

“A guiding coalition made up of only managers – even superb managers who are wonderful people – will cause major change efforts to fail.” - John Kotter

Create a vision for change

At the beginning of a change process, numerous ideas and solutions will float around. In order to go through the challenging task of implementing an ERP it requires that there are clear goals of how the company should operate. This includes expectations, deliverables and also a clear motivation of why the ERP system is being implemented and why it is needed in the organization (Falkowski, 1998). By using a vision these will conjugate, making it easier for people to grasp and understand why the change is necessary. When people see for themselves what is to be achieved it is easier to get them on board. The vision should be concise and understandable in order to be remembered easily. This will help in understanding the objectives and which strategy to use in the change process (Kotter, 1996).

Communicate the vision for buy in

Having a vision solely is not enough. Many companies under-communicate their vision, which stalls the change. The vision needs to be communicated frequently and simple. Every level of the organization should have effective communication in order to reach all the employees with vision, goals, changes and milestones. It should also be vivid using verbal pictures and invitational so that it encourages two-way communication. This can leverage success and facilitate enterprise-wide learning (Sumner, 2009).

By embedding the vision into everyday discussions and different forums such as reports, newsletters, weekly meeting and other communication tools the vision can be communicated among the staff. The communication should be two-ways and users should be able to give feedback. It is also important that the leader leads by example and refers to it in e-mails, meetings and presentations (Kotter, 1996).

Empower others to act on the vision

By following the previous steps the staff is mature enough to implement the change but there might still be barriers. Barriers can be in form of structures, skills, systems or supervisors. By giving the staff empowerment these barriers can be surmounted and the implementation can move on faster. Identifying, hiring or changing leaders whose main roles are to deliver change can do this. The organizational structure also needs to be in line with the vision and people who make change happen should be recognized and rewarded. By removing as many barriers as possible it can help in unleashing people to do their best work (Kotter, 1996).

Create short-term wins

To ensure a positive view of the change process during a longer period of time a feeling of success needs to be mediated. This involves creating clear, visible success stories, early and during the process. These short-term wins provide evidence that the efforts are paying off and boost morale and motivation. Without this critics and negative thinkers can undermine the credibility of the change project. The short-term wins are therefore a way of keeping up the momentum (Kotter, 1996).

Consolidate improvements and produce more change

Many projects can fail if the victory is declared too early. As resistance to change can re-emerge it is vital to keep the urgency level and to keep focus on continuous improvement. Using credibility from earlier gains and to analyze what worked and what did not can help in the future development of other change projects (Kotter, 1996).

Make the change stick

Confirming the changes in corporate culture enables the change process to be integrated into the daily work. New practices must grow deep in to the organization in order to integrate the vision and the process of change. To implement this the leaders must be able to prove that the new way is superior to the old and to reinforce this culture to new employees. As tradition is a powerful force and by getting the changes to stick enhances the chances of success in the long run (Kotter, 1996)

Alternative change model

There are many other change management models and one that is commonly used is the *ADKAR* model. Its acronyms stand for Awareness, Desire, Knowledge, Ability and Reinforcement. It is built on practical research in collaboration with organizations and companies and the main idea is to give a simple and easy tool that focuses on each person's ability to transition successfully. Jeff Hiatt (2006) describes these steps five steps as the following:

1. **Awareness of the need for change:** People need to understand the nature of change and why it is happening. This includes communication about the change and what the purpose of change is.
2. **Desire to support and participate in the change:** This represents the willingness of the people to support and engage in the change efforts. This is dependent on the person's motivation and can be influenced by personal situation or by the nature of the change.
3. **Knowledge of how to change:** In order to change people need to have the knowledge, training and education that are necessary to perform the change. It involves knowledge about processes, tools, systems, skills, job roles and techniques that are required for the change.

4. **Ability to implement required skills and behavior:** The execution of the change means that one turns knowledge into action. It tests the ability to achieve what has been planned.
5. **Reinforcement to sustain the change:** To make change happen is not solely enough but it also has to be maintained in order to bear fruits and be sustainable. It can be enhanced by recognition, rewards and celebrations that encourage the change on a personal level.

Why choosing Kotter's model

ADKAR is a bottom up approach and it describes the change management process in a good way but the reason why we choose Kotter's model was because of its holistic view and top down approach. Its clear steps can give a good guidance in the process and it also highlights the importance of leadership and is more forceful in implementing the actual change. ADKAR however can be an important methodology when studying resistance to change on a more individual level.

4 Empirical Data

Here the data is presented from interviews, questionnaires and archival data. The empirical chapter is descriptive to show how the situation is today at Maersk Drilling and what the different actors says about the changes in processes and upcoming challenges. The actor Maersk Drilling (MD) is described from both the SCM track in the ERP project's view, MDPRO's view and MD offshore to get the offshore perspective. The study took place before the implementation.

4.1 Actors and organization

In this chapter the different actors that have been interviewed and their relationships to each other are described. A rough map over the actors in the supply chain can be seen at the next page in figure 14. See Appendix 1 for the persons interviewed and Appendix 2 for more details. In Appendix 5 the questionnaire can be found with the answers in Appendix 6.

The involved actors that were interviewed were:

MD Procurement – Working with strategic procurement at MD.

MD ERP team – Procurement and SCM – Working with the procurement and SCM processes and making them fit with the new system.

MD Offshore – Persons working offshore on oil rigs for MD.

Group Procurement – Central procurement function of Maersk Group. Doing operational purchasing for MD.

ERP vendor - Selling and installing the new ERP system.

Implementation consultants – Helping management with the implementation and keeps the project on the right track.

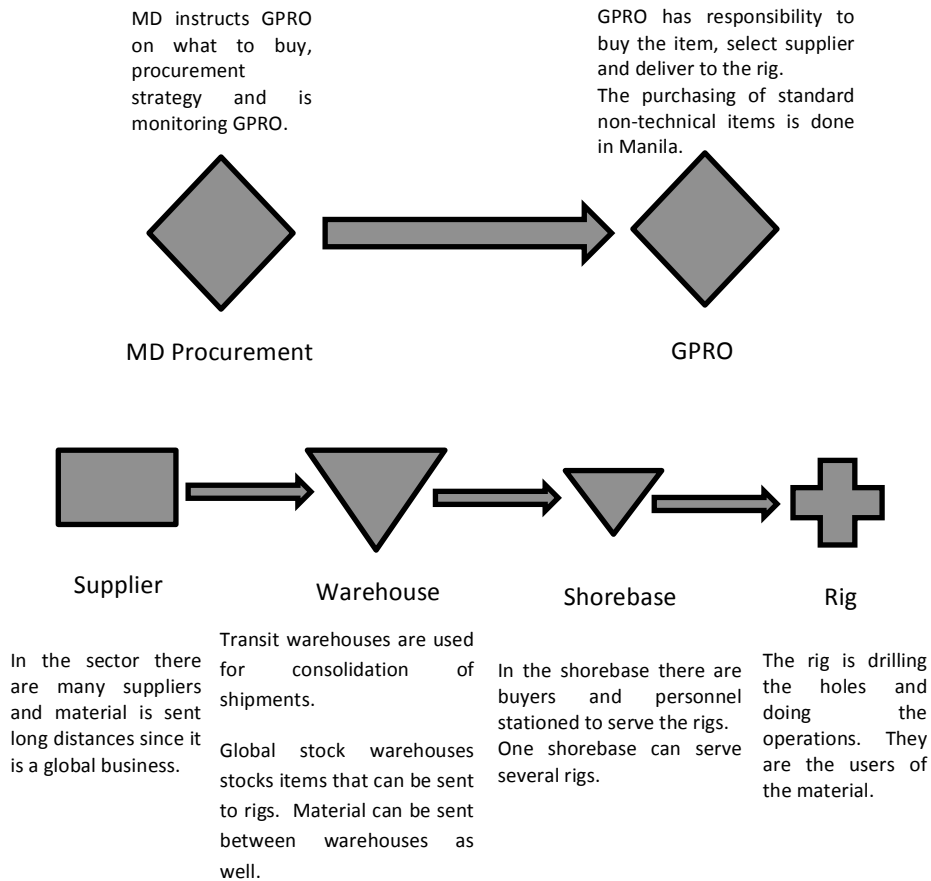


Figure 15 A rough map over the actors in the supply chain. Observe that the goods and information flow is not representable by the arrows. It is a very simplified picture.

4.1.1 Maersk Drilling (MD)

In the report, people in the ERP project working with supply chain, the procurement function at MD and two persons in the ERP project with experience of working as materials men offshore has been interviewed to get different perspectives in MD.

The mission of MD is “To create safe access to energy” and the vision is “To be recognized as an outstanding provider of high quality and cost effective drilling services through the integration of advanced rig equipment, innovative technology, highly skilled people and safe operations”.

Processes are viewed as one of the key parameters to reach the vision (Strategy Proposal)

“Processes – ensuring process excellence to achieve higher quality, reduced costs and increased safety” – MD (Strategy Proposal, slide 27)

According to the Annual Report 2012, MD made a profit of 359 million USD in 2012. They aim to make a profit of one billion USD in 2018, and the company is in a period of heavy growth. They will recruit around 3000 new employees until 2018, and there is a shortage of skilled labor in the market. They have seven new rigs that will be delivered in 2013-2015, and they have contracts for five of those already. The result of 2012 was negatively impacted by delayed start-up and the maintenance of two rigs.

The most important performance indicator for MD is uptime, since the revenue is based on day rates (Strategy Proposal). Uptime is the percentage of the total time that the rig is up and running. No uptime means no cash; when there is uptime a customer is paying and cash is flowing into the company (MD Annual report 2012).

4.1.1.1 Culture of change at Maersk Drilling

In the questionnaire, there were different opinions on whether MD had a change-oriented culture. With a change-oriented culture it is referred to how often the company does changes (how used they are to changes) and how open to changes the organization is. It was however stronger support to that the culture was change oriented according to the questionnaire, see figure 15 (see Question 24, Appendix 6) According to the head of procurement, the change readiness in MD was high in management but a bit lower offshore. The opinion from an implementation consultant that has seen many companies and organizations was that MD had a solution-oriented culture, when they have a problem there is a willingness to solve it. The consultant also believed it was a change-oriented company. He also shared the belief that the offshore employees needed clear communication in order to accept new solutions, and to clearly see the benefits for the offshore business.

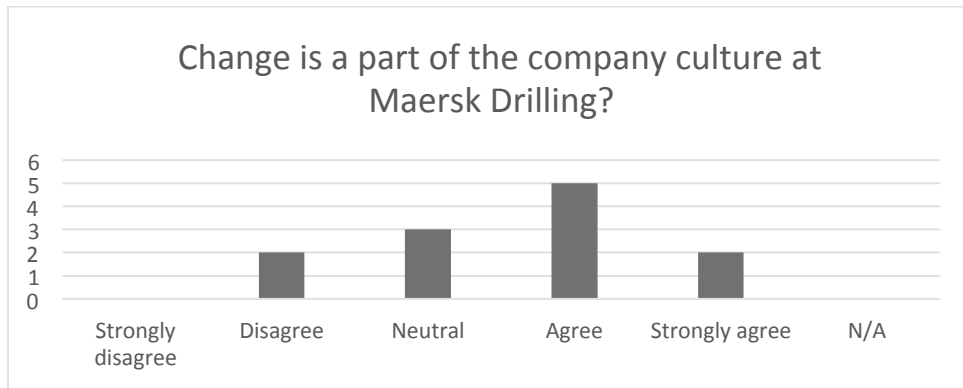


Figure 16 Change is a part of the company culture at Maersk Drilling?

4.1.1.2 Procurement (MDPRO)

In MD Procurement the head of procurement and the General Manager of procurement was interviewed as well as the person responsible for supplier relationship management.

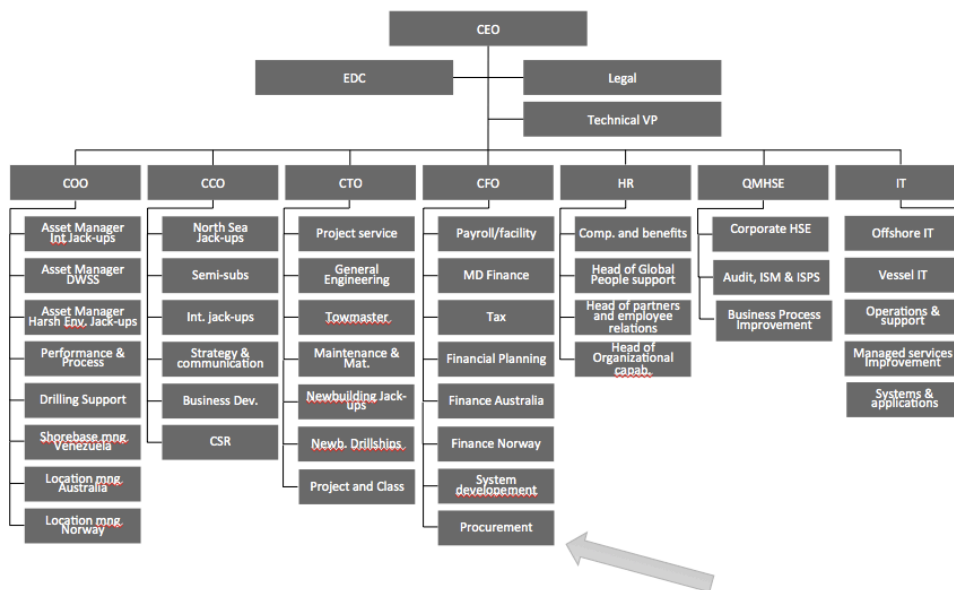


Figure 17 The organization chart. Procurement is situated under the Chief Financial Officer.

As seen in the organization chart (figure 16) procurement at MD reports to the CFO and is under finance, and not represented in the top function of MD. Generally MD has very good relations with the customers, but not as developed relations with the suppliers. The focus of the procurement

department at MD is on early supplier involvement, big procurement projects internally and the involvement of major projects. MD Procurement was working with getting more data driven decisions and enable procurement value by closer supplier relationships according to the General Manager. It was confirmed by a team member in the SCM track with significant procurement experience that a goal was that every dollar should be spent professionally. They are also working with processes (mapping and improving) and to get more exact reorder points according to the supplier relationship manager.

One could say that all material that MD buys is indirect, since the company is selling the service of drilling holes to the oil companies and the material bought is to make the hole. No material is delivered directly to the customer said the Head of Procurement. All the tactical and operational purchasing activities which includes category management and the purchasing itself, are outsourced internally to GPRO, hence procurement is not considered a core competence at MD said a person at MDPRO. The role of MDPRO is rather to show in which direction they want GPRO to go, and MDPRO has the final say in the purchase according to the general manager.

The procurement function is currently working on defining a high level strategy, and a guideline is that the procurement should be reliable. The view of procurement before was that it was not considered more than a transactional function "they only want savings". Now procurement is more and more regarded as an important function that can contribute in more ways to the business than only in savings, said the Head of Procurement.

Officially GPRO is right now the process owner of the purchasing process, but indirectly it is MD who owns the process, since they have power to overrule decisions and can instruct GPRO on how to work said a member in the ERP team.

Centralization in procurement

The head of procurement said that MD has a partnership with GPRO. If you look at the procurement at MD, the view is that it is highly centralized since

the procurement is mostly outsourced to GPRO. GPRO is in itself pretty centralized since direct reporting to Copenhagen (HQ) is common. GPRO has a buying center in Manila where standard buying is done. However the buyer who works on the shorebase is buying for the rig he or she is responsible for and can make decisions depending on what is best for the rig. It makes it more decentralized in a decision-making sense since the rig manager needs to approve the purchase. However a buyer from Group Procurement stated that the purchasing was centralized on a group level in Maersk.

4.1.1.3 ERP team - Procurement and SCM

The Procurement and SCM track in the ERP program are responsible for designing the logistics and warehouse processes and issues in the ERP project.

In the overall scope of the ERP project, the supply chain part of the project covered procurement, logistics (both offshore and onshore) and inventory and material management (both offshore and onshore) (Project Introduction).

The Procurement and SCM track concentrates on the entire purchasing process from the requisition to the purchase and shipping, stocking and return of goods (Intranet). In each of the tracks there is one person from the ERP vendor and one from MD who is responsible for the track (ERP Consultant).

In the Procurement and SCM track, the team members had various backgrounds. The team lead had earlier experience with ERP systems from another business unit at Maersk. One person had earlier experience from GPRO and the person responsible for inventory and warehousing also had previous ERP experience. One ERP team member had strong academic and theoretical skills to contribute with and deep knowledge in SCM. On the basis of that the team was complementing each other. Most of the members have been visiting a rig to get understanding of the conditions.

In the questionnaire (Question 22, Appendix 6) there was strong support that there was a good mix of people in the project, see figure 17. That was

the overall impression in the interviews as well, everyone thought that there was a strong team with a good mix of competence and experience. “There is a positive spirit in the ERP teams, and people in the project are positive to change” says one of the ERP team members – Procurement and SCM.

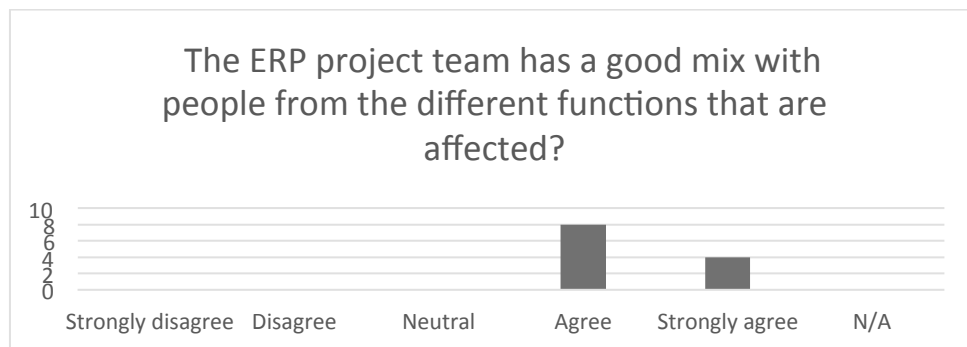


Figure 18 The ERP project team has a good mix with people from the different functions that are affected?

4.1.1.4 MD Offshore

Two of the interviewed persons had offshore background, meaning that they have been working on rigs offshore with logistics as materials men. They were working in the Maintenance and Operations track, with processes related to the maintenance, repair and operation of the fleet of rigs and drilling ships. The persons with offshore background contributed to the project with experience and opinions on how to shape the solution to make a good fit with the offshore users (Intranet). In the ERP project there also came in persons working offshore ad hoc to give their opinions on the new system said a materials man.

The materials man is the one on the rig who sends the purchase request to the purchaser on the shorebase. When doing changes it is very dependent on the attitude of the materials man, if it is a person who is willing to adapt it can go very smooth. But then two weeks later the shift is over and the new materials man might be very cumbersome to work with and not very change-oriented. When working with processes it can also be tricky, people say they follow processes while not really doing it said a materials man.

“The materials man is the glue between the rig and the purchasing department” – The General Manager Procurement

According to another materials man with long experience, MD is very good a “firefighting” i.e. solving emergency problems, but the rig needs consistency in the support from procurement. The rig has a very big say in what is being purchased, they always say that “if we do not get this, we risk downtime” which is very expensive, and they usually get their will through. Processes of working are different at different rigs as well. The people working on the rigs often works under high pressure, and are very focused on the uptime. It leads to that the people working offshore often do things the easiest way possible. An example from one interviewee with offshore experience is:

“Instead of going through a 15-step scrapping procedure to scrap a hammer, it is easier to throw the hammer overboard and adjust the inventory with minus one” – Materials Man

In many interview the rigs were described as “Their own kingdoms”, and that each rig think they are very different from each other. The persons working offshore were often described to have a tough attitude and tough mentality, and people from the office must prove themselves and that they know anything about drilling before they are accepted and can have a dialogue said a lead buyer at GPRO.

“Rigs personnel does not like surveys or questions from people who don’t know about rigs” – General Manager Procurement

4.1.1.5 Other supply chain actors at MD

In the supply chain at MD there are several other actors. The supply chain is complex and goods can be sent directly from supplier to a shorebase. Goods can also be sent between transit warehouses, GSS, shorebases or even rigs in some cases said a member of the ERP team. For an overview see figure 14.

The suppliers: In the oil business there are a lot of suppliers, and many are sole suppliers of specific parts said the Head of Procurement. The suppliers

who deliver the rig are only a few really big ones according to the supplier relationship manager.

Transit warehouses: When goods are supplied from outside the country where the rig is stationed, it is sent to the transit warehouse. In the transit warehouse the goods is consolidated with other goods that is going to be sent to the rig, and then shipped out. The transit warehouses do not keep stock at all said an ERP team member.

Global service stock (GSS): GSS is working as a normal warehouse where items that are required by rigs or customers to be on stock can be held. When the item is needed it can be sent away. Today there are GSS in three places, which are run by GPRO personnel at one place and otherwise by third party personnel, or MD.

Rigs: The rigs are doing the operations, drilling, maintenance as well as on-the-job training (Strategy Proposal).

Shorebase: The shorebases are doing cost controlling, reporting to tax authorities, local recruitment, local IT, local purchasing, financial compliance and rig personnel coordination (Strategy Proposal). The personnel are hired by MD and reports to GPRO (ERP Team Member).

Headquarters (HQ): The HQ are responsible for the financial management, newbuild and yard stay projects, global procurement, global processes, global IT and global recruitment (Strategy Proposal).

4.1.2 Maersk Group Procurement (GPRO)

GPRO is the procurement function for the Maersk group. They handle procurement for the group and try to exploit the economies of scale when purchasing by consolidating volumes and currently owns the purchasing process, according to a lead buyer.

One of the interviewees was a key account manager (KAM) for a rig (responsible for getting all material needed there) and the other one was a lead buyer. The key account manager had cooperated with the SCM track in the ERP project to give feedback from GPRO in the process designs.

GPRO is the procurement partner to MD. MD does not send out any purchase orders, it all goes via GPRO. The lead buyer said that some of the responsibilities that GPRO has are to:

- Provide needed material to the rig
- Placing all orders and do operational purchasing for MD
- Do spend analysis
- Secure a good price and right quality of purchased goods
- Select supplier

GPRO has hired the personnel who work in Esbjerg warehouse and the purchasers at the shorebase. It is key for GPRO to support uptime for MD. MD can always overrule the purchasing decision of GPRO, since they have the final say. The engineers at MD do not always have a cost perspective, and that is a challenge for GPRO to handle stated the lead buyer. When standard material is purchased, it is often done from Manila where there is an operational purchasing center according to an ERP team member.

“Lube is a religion, there are engineers who has been working with the same lube for 17 years” – Lead Buyer

Another important aspect is the rig manager who has the ultimate responsibility for keeping the rig running, and can “do whatever it takes” to make that happen. He has the power to override a purchaser, and when purchasing expensive items the rig manager must confirm. Each rig is considered as its own company according to the lead buyer.

4.1.3 ERP Vendor

The ERP vendor is a mid-sized company, with around 2800 employees. They have a strong presence in the oil and gas sector. The vendor had experience with drilling-companies before and had reference customers in the sector. The company had also worked with Maersk before in a software solution for another business unit in the Maersk group (Project Introduction)

For the ERP vendor it is a big and significant project, one of the biggest projects ever and a possibility to get good references in the industry. New

solutions were developed and the ERP vendor could learn from the project. In the solution, the “oil and gas vertical” is used, the solution that is especially adapted to the oil and gas sector said an ERP consultant. He also stated that the vendor is providing education to the super-users for the system as well.

4.1.4 Implementation Consultants

The implementation consultants were involved in the ERP project to ensure that the savings that was intended in the project actually was fulfilled and that the project is on the right track. They had experience in change management and supply chain management. The SCM consultant was involved in the SCM track in the ERP project. The consultant worked with process development and project management issues.

According to a member of the SCM track, the implementation consultants have the role of arranging workshops, take a management perspective and have a holistic perspective. The workshops were cross-functional and made sure that everyone was on track and aligned in the ERP project. They also update the management of the ERP program on the opinions of the different tracks and presented results to them said an ERP team member.

4.1.5 Organization and planning

4.1.5.1 Implementation plan

The whole project started 2012 after MD had made a pre-study with the requirements of the solution and chosen what ERP system to go with. The project has several phases and is estimated to end in 2015. The different phases of the project are described below, Intranet, see figure 18:

Initiation phase - Nov 2012

In this phase, the project is defined, planned, and established. The project organization takes shape. The project methodology is put in place and project members get acquainted with it. Goals and scopes are outlined. The technical platform and infrastructure is set up. (Intranet)

Confirm and Specify - Dec 2012

The scope for the solution to be implemented is confirmed, documented and approved. Business processes are re-visited in workshops, written down and accepted. Data standards and specifications of the ERP solutions are defined. Integrations between business processes and system processes and customizations (if a standard module cannot be used, a custom solutions has to be built) are identified and outlined. Data cleanup in legacy systems begins. (Intranet)

Establish phase - June 2013

Solution build commences. Integrations and customizations are approved. The Production environment is configured. Application Solution Test is approved. Support organization is defined. Change management is planned. Work instructions and user guides are created. (Intranet)

Implementation phase - January 2013

Change Management is prepared. Solution is validated. Training is performed. Customer Solution Test is approved. Migration and cutover are tested. Organization prepares for go-live. (Intranet)

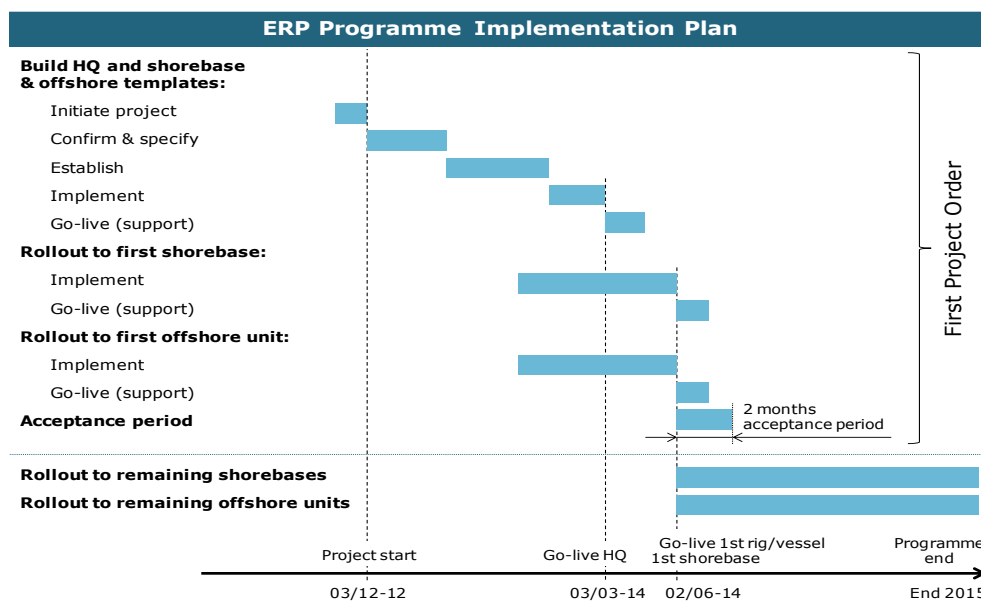


Figure 19 The implementation plan for the system (Shorebase Meeting)

When the study was done the project was in the middle of the establish phase.

4.1.5.2 ERP Programme Structure

In the ERP project there was a clear structure on the different roles and responsibilities. See figure 19 for a chart of the organization.

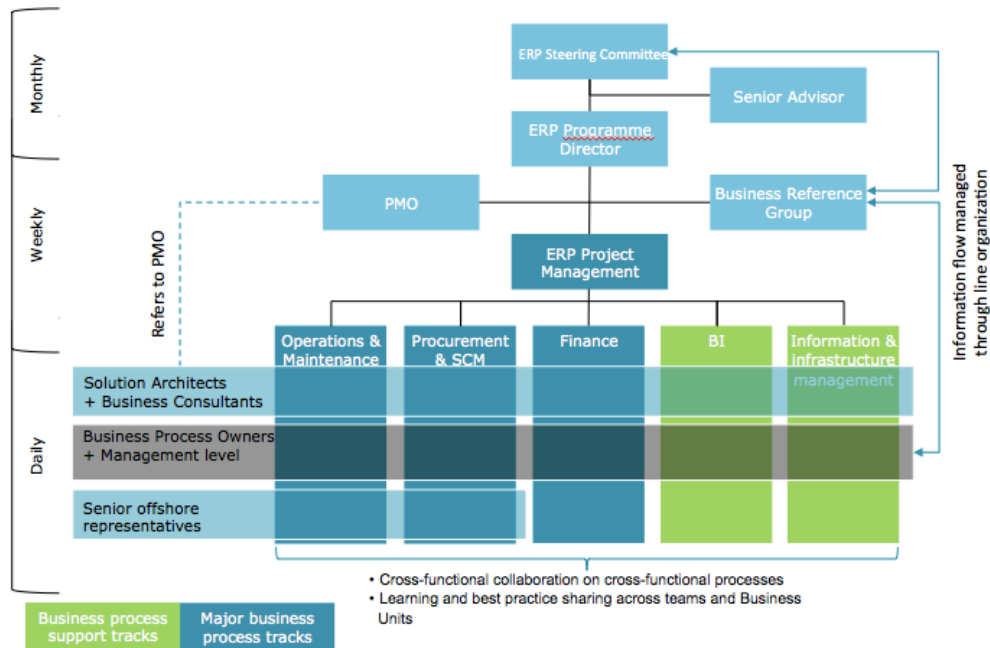


Figure 20 Description of the ERP Programme organization (Shorebase Meeting)

4.1.5.3 IT Steering committee (ITSTC)

The steering committee is the owner of the program. It has the responsibility to approve major decisions such as which ERP system to use, which consultants to hire and accepting the budget and implementation plans (Programme Structure).

4.1.5.4 ERP Programme committee (ERP PC)

Has the responsibility to report to the steering committee and direct the ERP program and make sure that the focus of the programme is in line with the business objectives. Tasks include: manage top risk items, ensure delivery of business case and decide on key aspects etc. (Programme Structure).

4.1.5.5 Programme Management (PM)

They report the ERP PC and handle the daily management of the ERP Programme and makes sure that the requirements reflect the business needs. Tasks include: manage the project within scope, budget and plan, align actions with ERP PC, solve and escalate issues, report inconsistencies and risks etc. The project management office supports PM in planning, coordination and communication (Programme Structure).

4.1.5.6 Business Reference Group (BRG)

The responsibility of BRG is to decide on business issues from the ERP team and ensure that the solutions meet the needs of the business. The tasks involve deciding on cross-functional and BU process decisions, providing input and solving business issues, participate in ERP software evaluation and confirming and approving business cases (Programme Structure).

4.1.5.7 Team Lead (TL)

The TL reports to PM and is responsible for the collection and documentation of business requirements as well as designing processes and has responsibility for organizational alignment. The tasks include planning and conducting solution design activities, leading workshops, define KPIs and define process and role mapping (Programme Structure).

4.1.5.8 Team Members (TM)

Reports the TL and ensures that relevant requirements are identified, documented and approved. The tasks include identifying and documenting business requirements and relevant input as well as ensuring alignment across functional areas and evaluating the ERP landscape. There are subject matter experts as well who has no formal reporting, but helps in the work with business requirements and demo scenarios and participates in activities to contribute with their knowledge. (Programme Structure)

4.2 Current state at Maersk Drilling

In this part the state of the logistics and supply chain processes and the IT landscape at MD is presented. The current state chapter is providing a peek into MD's logistics processes today and what the IT system look like.

The core process for MD is operations, i.e. the drilling itself. Supply chain and procurement is considered a joint support process, see figure 20. (Strategy Proposal).

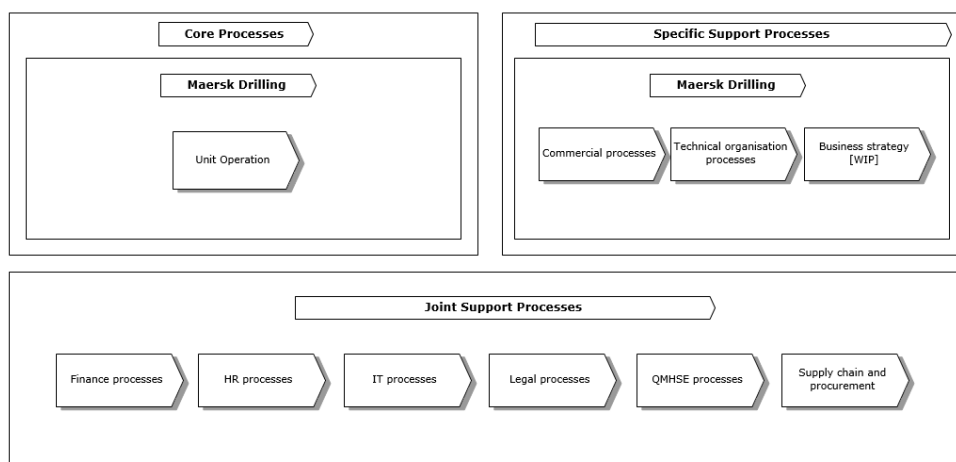


Figure 21 Overall current processes in MD (Strategy Proposal).

Within the supply chain and procurement process, it is procurement and logistics that are considered as core processes. In procurement it is the purchasing and strategic procurement tender that are considered most important (Strategy Proposal). Purchasing refers to the operational purchasing with order generation and approval in ERPX, then generating the order in RFMP, and finally receiving and registering the goods (Sirius). Strategic procurement tender is the process used for expensive purchases which requires total cost of ownership analysis, cost breakdown and a tender process with suppliers (Sirius).

Shipping goods to an offshore unit includes planning for the shipment, packing the goods, printing the necessary documents and registering the goods that is leaving in RFMP. Finally the goods are shipped and registered at the receiving at the rig. In logistics backloading is when goods is shipped

from the rig to the shorebase (Sirius). In a study the procurement process was found to be similar with normal best practice processes and the procurement and logistics processes were considered mostly standard but with a few complex processes (Strategy Proposal).

The approval process includes three parts:

1. Approval of the need (the rig manger offshore)
2. Approval of the spend (Budget Responsible – will typically be the rig manager onshore)
3. Approval of the purchase (thereby approval of the purchasing process e.g. supplier choice and sourcing method).

Normally the purchaser can approve the last part and is the expense goes over certain thresholds the responsible needs to contact his or hers manager, according to an ERP team member with purchasing experience.

The support processes of procurement in the current state are “contracts, frame agreements and service agreements”, handling the standard article catalog, inventory management, supplier management and the supply chain and procurement definition of authorities (Strategy Proposal), see figure 21.

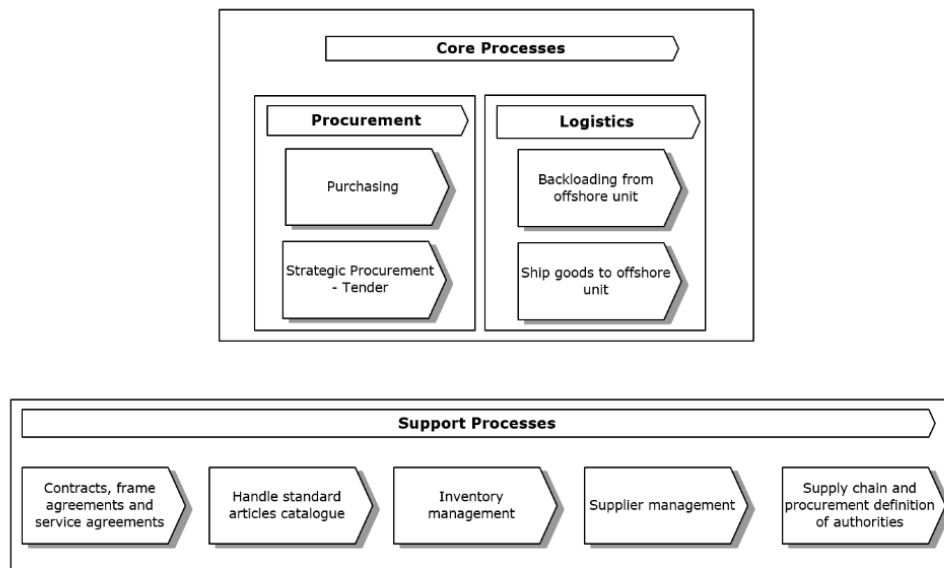


Figure 22 Procurement processes at MD (Strategy Proposal).

As seen in figure 22, which displays the purchasing process there are numerous handovers, a lot of mailing, many people who do not know the status of the order. In general a time consuming process with much waste (Project Introduction). On a rig it might be 45 people and about 35 of them uses ERPX on a daily bases, so ERPX is widely used in the organization, said a materials man. The interviewees from MDPRO were agreeing on that the procurement function today could be developed more and needed more support from the IT system.

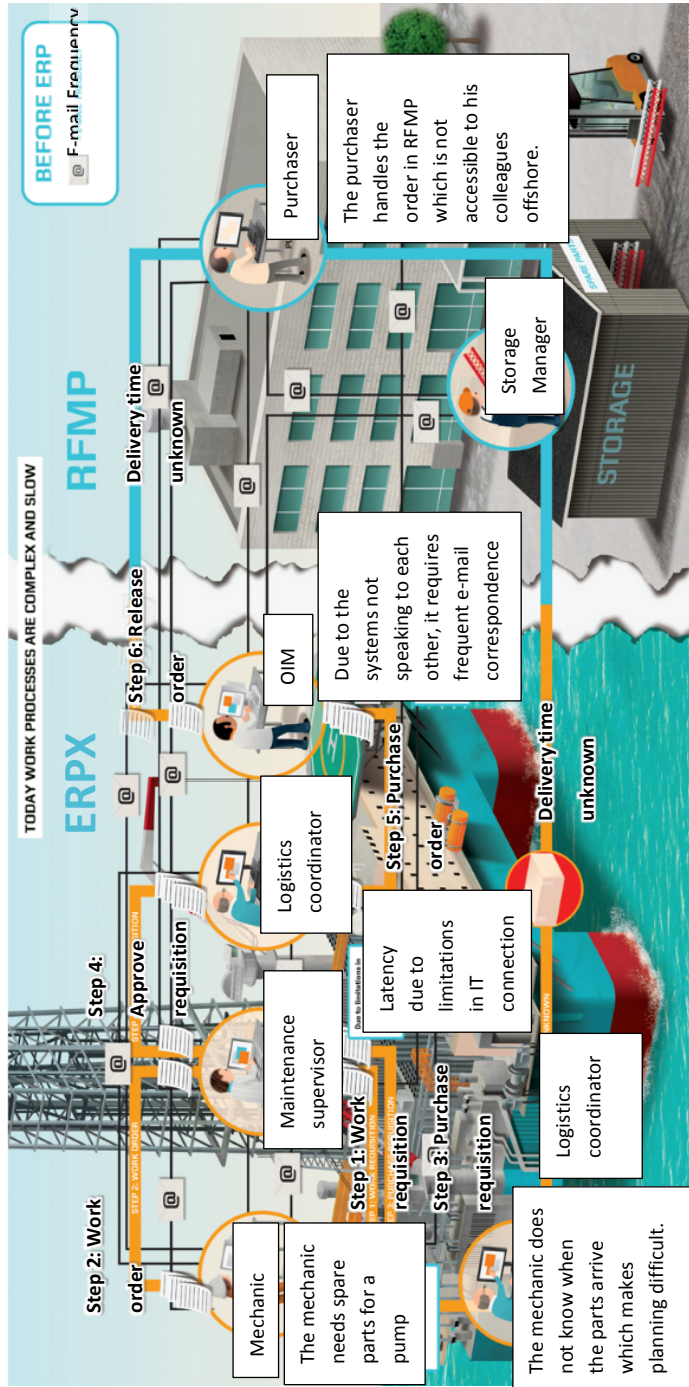


Figure 23 The split IT-landscape today and the ordering process (Project Introduction)

Freertext orders

In the current system something called freertext orders can be used. When the material that the rig wants is not registered with a part number, it can be ordered via freertext. Then the rig manager just writes in what he wants to order in a message to the purchaser onshore. Since the communication is not always clear, it means that often several messages must be sent before the wanted item can be purchased. A freertext order costs extra money, is more cumbersome to work with and means much manual work than an ordinary order stated a materials man.

Firefighting

Firefighting was a term often used during the interviews; it refers to emergency situations where material is needed immediately. Due to insufficient planning material sometimes has to be flown in with airfreight, which is very expensive. The new solution is expected to reduce airfreight with 10-20 % (Business Case Benefits).

Catalog

In the catalog all the frame agreements and consumables are registered. GPRO is updating the catalog, since they negotiate the agreements. Jcat is the new catalog solution which is its own project on the side of the ERP project, said a member of the ERP team.

4.2.1 The purchasing process

In a strategy proposal based on interviews and workshops in 2011 it was found that the procurement system needed to support procurement of all types of goods, it was not integrated with the activities in operations and planning, and it needed to support procurement of all types of goods (items, services etc.) The purchasing process could be improved with the new system. (Strategy Proposal)

As seen in Question 20 (Appendix 6) most of the interviewed person agreed that they had found much waste in the current processes, which indicates an inefficient way of working, see figure 23.

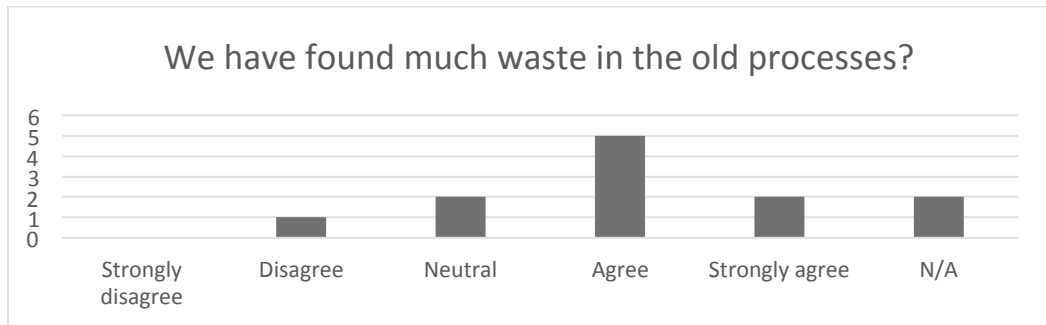


Figure 24 We have found much waste in the old processes?

4.2.1.1 Specification

One of the reasons to use freetext is that the catalog is poor, so it is not possible to choose something from the catalog (General Manger Procurement). The problem with the material numbers was addressed in the other interview as well, duplicated material numbers lead to unnecessary information and not as good overview over the item said a materials man. In the situation today 74% of all orders are freetext according to a presentation (Business Case Benefits). In the interviews everyone agreed that the percentage of freetext orders was way too high. It is hard to set a specific number, but most interviewees mentioned between 70% up to 90% of all orders were freetext in today's situation.

4.2.1.2 Supplier selection

One person in the ERP team meant that today there are too much sending of RFQ's (requests for quotation) since the frame agreements are not used to the extent they should be. Since the frame agreement is not used, a new RFQ needs to be sent out to get the best price, and this process takes time (ERP Team Member). Otherwise there were no major issues mentioned with the supplier selection in connection with the ERP system. The Head of Procurement addressed that within procurement for example many persons have different preferred suppliers.

4.2.1.3 Contracting

The usage of frame agreements in the operational purchasing was found to be too low (Strategy Proposal). The increased spend on frame agreements was one of the biggest economic drivers for the ERP project, stated a

report on the business case benefits (Business Case Benefits). Another issue is that much material is non-existing on the frame agreements, which generates freetext orders, (Materials Man).

4.2.1.4 Ordering

The common lead time offshore is 3 months for whatever the item is. *“One time a guy ordered 500 plastic folders and he got 500 boxes of plastic folders out on the rig”*. It shows that even though two persons approve a buy, it is not always correct and the event happened because of poor data. Another time the materials man was told that it would take six months just to get normal AA batteries. It shows the long lead times that occur sometimes (Materials Man).

The latency in the system is generating much frustration and many hours are spent waiting for the system to load in the ordering process. Often it is possible to go and take a cup of coffee while the ERPX system is loading on the rig according to a materials man.

4.2.1.5 Expediting

The personnel offshore spend much time on administration, which needs to be reduced (Strategy Proposal). A lot of time is spent on finding the right product and making sure that it is the correct one, time that could be spent better according to the ERP team.

“Around 30%-50% of the time as a materials man is spent looking for stuff”
– Materials Man

Everyone interviewed in the ERP team agreed that it is a big problem that it is not possible to see what has happened to an item after it has been purchased. Both interviewed persons with offshore experience took up the issue with lost items and that a big part of the working day was spent doing “detective work”, because of the split between RFMP and ERPX. There is not enough information on what has happened to the order, and the rig personnel are often in the dark if for example the purchaser forgets to follow-up on the order stated both materials men.

“The split between RFMP and ERPX creates a barrier between the materials man and the purchaser” - Materials Man

4.2.1.6 Evaluation

The most frequent problem that came up with the supplier evaluation was that the poor data on the suppliers and lead times makes it difficult to evaluate a supplier and compare them said a person from MDPRO.

4.2.2 Process standardization & compliance

The processes documented in the software Sirius are not the same as what actually is happening in the real world. People say they follow the processes but do not, according to several interviewees like an ERP team member and a materials man.

An example was from a materials man who had seen many persons do things the easiest way on the rigs, not bothering about the processes or the costs. It can be related to the fact that the persons working on the rigs are often working under high pressure and the operations focus on the rig to keep high uptime.

“Instead of following a 15 step process for scrapping a hammer, most people do it the easy way and throw it overseas and write down the inventory in ERPX” – Materials Man

The rigs and warehouses do not work in the same way, so MD needs to standardize to make it easier to introduce new personnel said an ERP team member. The head of procurement shared the view and addressed that MD need to become more process oriented, and get more control of the processes.

4.2.3 Information sharing

In MD today, the sharing of information between departments and rigs is low. The rigs are managed as separate independent units, and there is no exchange of information between the rigs (Strategy Proposal). The Head of Procurement stated that there are often different practices between the rigs.

The general manager stated that lack of data makes it difficult to see the inventory on the rigs. It was supported by a member in the ERP team, who stated that there are no real-time inventory levels in the current system, which leads to lower traceability of good. “When people do not know what is happening, it generates more calls and mails” said an ERP team member. It was supported by a report, saying it leads to unnecessary high stock levels (Business Case Benefits)

“There are a lot of inventory that is not moving on the rigs, and the transparency is not good so it is difficult to see what is stocked on a rig” –
ERP Team Member

An ERP team member said that transparency is an issue with the current system. One example was when a motor was needed, and no one knew who was responsible. Twenty persons were involved in getting the motor to the rig on time, and a lot of man hours and resources were wasted when firefighting.

4.2.4 Working cross-functional

The team member responsible for inventory management said that because of the long lead times it is important that MD gets better at planning, and needs a better overview. Other ERP members stated that there is no MRP planning today, which leads to “firefighting”. It was supported from a materials man. The plans for drilling and maintenance are not integrated and it is a big puzzle to do a project on a rig according to a materials man.

4.2.5 Integration with customers and suppliers

A manager at MDPRO said that in the communication with the suppliers there has been much mailing and telephone conversations, but no one is keeping track of what is happening. There have been cases when services for millions has been exchanged but there are no financial commitments.

4.2.6 Purchasing organization

A person from offshore talked about the relation with the purchaser. The purchaser that is responsible for a rig often knows how to think ahead and

what the rig needs. If the purchasing function is too centralized that benefit can disappear. Proactive purchasers are very important, since they know the rig and its needs stated a materials man.

4.2.7 Business process ownership

In the current system GPRO owns the purchasing process, see more under the actor “GPRO” in section 4.1.2.

4.2.8 Current ERP landscape

Today the company is working with several IT systems (Vendor Solution Presentation): CODA (Finance), CMS (Finance), RFMP (Procurement), Excel and ERPX (on the rig and procurement reports). One ERP team member said that the landscape today is not very coordinated since it consists of three different systems.

In a presentation for the executives it is said that the IT landscape today at MD has serious consequences for the business processes. It affects procurement, cost controlling, document management, finance processes, management reporting, system integration and long response times (Executive Presentation). Because of the large expected growth, a system that is supporting the growth and is scalable is needed (ERP Team Member).

The ERP maturity in the firm was considered low and change management was needed in the project (Strategy Proposal). As stated earlier the link between ERPX and RFMP is not very good. The material and articles are in different systems today, which are not often synced, said the supplier relationship manager.

In general the current ERP landscape is characterized by the following (Executive Presentation), that also had support in the interviews:

- Consisting of many systems managed in silos.
- Low data validity
- Poor usability
- Long response time
- Non-value adding processes

- Low transparency
- High complexity and outdated systems
- Insufficient management reporting.

Although there are many complaints about the system in the study, the general manager pointed out that a benefit with RFMP is that it can handle large data volumes and never stops working. If the data was correct and processes were followed today's system could be really good but in the real world that is not the case said a person at MDPRO. There is much administration in the current system. The benefit of today's system is that it's fast and easy to put out a fire, and get critical material fast (ERP Team Member). The problem is that you are only as good as the one who is teaching you. The current system is not very user friendly (General Manager Procurement). The supplier relationship manager agreed that the system is not very intuitive, and said that the user has to learn a lot of codes.

4.2.9 Management reporting

There was also a need of better management reporting (Strategy Proposal). The head of procurement agreed that one issue today is that too many people are sourcing and it is difficult to keep track of it. There is a lack of spend-visibility and it is not easy to generate reports from the system to see the compliance for agreements (Head of Procurement).

The difficulty to get an overview is another problem. It leads to insufficient information backup in supplier negotiations and not enough understanding of how much that is spent where, according to the general manager.

Many of the interviewees talked about the spend reporting, and that it needs to be improved well, since it is important when preparing for supplier negotiations. The poor spend reporting is linked to the high usage of freetext orders said an ERP team members and the team lead.

4.2.10 Data quality

Regarding the data quality it was agreed that it was a problem. Within the ERPX system there is 12 years of data stored, so there is a lot of

information even though the quality of the data sometimes is questionable said two persons at MDPRO. The supply chain needs good master data in order to be functioning. The master data is quite messy right now, and since there are several systems there are several versions of the same data, which not always fit, according to the ERP team lead.

According to the interviewees the poor master data often leads to wrong deliveries. In a two-week period the rig often get 2-3 items wrong, (Materials Man).

4.2.11 Group Procurement (GPRO)

Many problems stated by MD were shared in the view of GPRO.

4.2.11.1 The Purchasing Process

The high amount of freetext orders, which today adds up to about 90%, leads to poor data (Key Account Manager). The catalog needs improvement as it does not cover enough parts in the current situation (Lead Buyer).

More detailed data is a way to directly save money by choosing better suppliers and knowing the spend. Also it is important to have data when negotiating about important parts stated the lead buyer.

The situation according to the lead buyer is that much money is frozen in inventory, and the lead times are very long so the purchaser has to plan well.

For a purchaser around 10-20 % of the time is spent on expediting, finding goods, making phone calls and mailing, which does not bring value to MD stated the KAM at GPRO.

4.2.11.2 The Current ERP Landscape

There are a lot of functions in ERPX and RFMP today, but they are not used fully. A purchaser at GPRO thought that the data solutions today are not intuitive, and requires much work before the purchaser can get out useful information.

4.2.11.3 Management reporting

There is no base line, and it is difficult to improve when you do not know where you are today stated the lead buyer.

4.2.12 ERP Vendor

The consultant interviewed from the software vendor had experience from many industries within supply chain management. He stated that the sourcing as it is today is a big problem that is widely discussed. The split IT landscape generates a lot of problems such as unnecessary work, low transparency and human errors. All the rigs have the same material as it is right now, which might not be necessary. The frame agreement spends needs to be higher and material is often missing when people come out to the rig to work. It generates a lot of extra costs and firefighting. Generally the company has not enough support for the business processes, which is needed to be competitive. It is about 2% of the stock that has a turnaround of two times in two years, a lot of stock is just lying there, which can be improved. Better planning would lead to lower inventory costs (ERP Consultant).

4.2.13 Implementation Consultants

In the interview with the supply chain consultant the current situation was not discussed very deeply. It was stated that the oil and gas industry is overall not very mature with regards to supply chain management. He also said that in today's setup it is hard to share information between the rigs. The overview today of what is bought is not there. Often the same thing is bought several times since there is no article number, rebuying will be easier in the new system.

4.3 Changes

In this chapter the changes with the new ERP system is presented and what the different actors think. The problems with the current system are presented and how the new ERP system will change it. The chapter is divided into different parts, one for each actor, in order to make the findings comparable for the analysis.

4.3.1 Maersk Drilling (MD)

To sum it up the strategy proposal stated:

“The procurement and logistics processes should be challenged towards simplification and be simpler and more standardized which creates higher business agility” (Strategy Proposal)

There were many presentations and different sources with the business benefits of the new system. The project is not an IT project; it is transforming the way MD is working (PETIL). An important aspect seen in many documents is that the system is supporting the growth strategy of MD, Strategy Proposal.

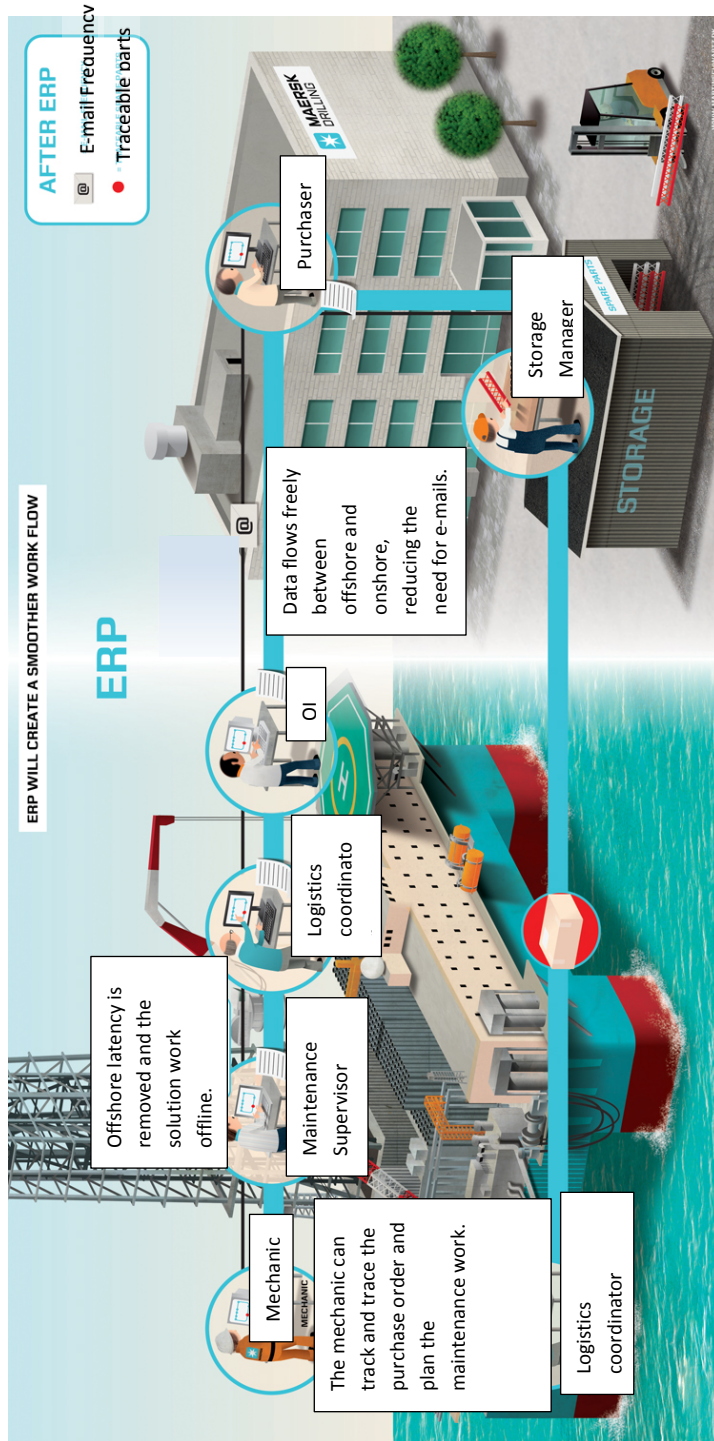


Figure 25 The new ERP landscape (Project Introduction)

The new process is more streamlined with fewer handoff, less mailing and phoning, and the information can be shared more easily as seen in figure 24 (Project Introduction; Strategy Proposal). It will also move some administrative tasks to onshore (PETIL). For procurement it includes better ability to invoice projects and purchases (Strategy Proposal)

The reduced offshore latency, will lead to higher focus on operational processes offshore (Project Introduction; Programme Structure).

4.3.2 The purchasing process

Within Procurement and SCM, “Master Data Management” was a completely new process. The following processes were optimized and improved; Purchasing, Project Purchasing, Shipment, Supplier Contract Management and Export Control.

The questionnaire (Question 14 and 29, Appendix 6) strongly supported that the supply chain resources would be used more effectively with the new system and that the quality of the activities would improve. There was also support that the cost of procurement would decrease (Question 28, Appendix 6).

In the purchasing process, lower usage of freetext will lead to clearer specifications and improved categorization, even though it might take longer time to fill in. The catalog will also contain more articles said an ERP member with support from the Head of Procurement. When a standard article is bought the purchase flow is automated, so bigger spend on standard articles equals more automated purchasing according to an ERP team member.

The supplier selection will not be affected by the system according to the Head of Procurement. The ERP team said that the supplier selection will mostly be affected by data on previous purchasing and better supplier evaluation, which leads to improved selection of suppliers that can deliver to a lower price, something that was mentioned in several interviews.

The Head of Procurement mentioned also that the contract coverage and compliance would increase. It was supported by the general manager that

a better overview over the contracts would be there in the new system. The ideal is that 99,9% of the transactions goes via the system and no freetext orders said the general manager. There was support in the questionnaire that more money would be spent on frame agreements, and spread opinions on whether the contracts would be easier to manage (Question 30 and 1, Appendix 6).

In the order process, it will be easier to follow the steps and more data involved. When material numbers are used the process is more automatic (ERP Team Member). That it was going to be easier to trace the goods, and see where the goods are and what has happened to the order were often mentioned by several ERP team members. In the questionnaire (Question 3, Appendix 6) there was a strong agreement that tracing and monitoring orders will be easier. A benefit that was mentioned in all interviews was reduced mails and phone-calls to find goods (ERP Team Member). The questionnaire gave mostly support to a decreased order lead time (Question 7, Appendix 6). The questionnaire (Question 4, Appendix 6) gave strong support to that supplier evaluation will improve.

4.3.2.1 Goals related to procurement and supply chain

The goals for the project that concerned procurement and supply chain were the following (Guiding Principles).

- 1. Optimise availability of spares and equipment by increased transparency across functions:** Transparency to see expected lead time, usage and availability of spare parts. Supporting exchange of material between rigs, more easily change supplier and work preventively when a delay is estimated. The benefits include right material ordered, less stress for user, higher inventory utilization, efficient operations.
- 2. Improve parts availability by optimising inventory management:** Ensures inventory visibility across the fleet, better fulfilment of material requirements for maintenance. The benefits include, reduced scrap and inventory levels, higher availability of parts, less downtime due to higher spares availability.

3. **Optimise our purchasing processes and reduce lead-times:** The optimization comes from: reducing steps and handovers in processes, better transportation process, reducing manual work and a better catalog functionality. The benefits include: higher quality of processes, reducing internal lead time and cost for urgent order handling, higher delivery performance.
4. **Increase supplier contract coverage and compliance:** increasing the usage of frame agreements and understanding the spend better, improved measurement of vendor performance and better communication with vendors. The benefits include: less freetext orders and thereby less wrong deliveries, reducing the supplier base and get a better bargaining power.
5. **Improve rental management:** Easier overview, handle reverse logistics (warranties deposits etc.) easier, manage down payments. Benefits include lower charges because of timely returns, enhanced overview, better cash management and less time spent on managing rentals.
6. **Improve warehouse operation (reduce stock size):** Forecast the storage, more effective picking and packing of goods, better overview over stock in warehouse and transit and who it belongs to. The benefits includes, less usage of handling resources and storage capacity, lower internal lead time and less urgent deliveries because of improved process time.

4.3.2.2 Process standardization & compliance

When the new process design was developed, there were guidelines to follow for the different tracks, which were used together with the ERP objectives (Guiding Principles).

- Use standard processes, in order to ensure scalability.
- Be able to move tasks to where they are performed most efficiently and with a sustained quality level (shore/offshore/outsourced)
- Support "only one data entry point" (one entry, one truth) so we can have reliable data
- Use data and benchmark for continuous improvement and strategic planning

- Support process integration throughout the value chain (from suppliers to customers)
- Be able to do integrated cross-functional planning
- Enable easy and accessible cost capturing at the right level to provide cost transparency and enable further analysis
- Enable empowerment of leaders and employees (knowledge and decision making at the heart of action)

According to the head of procurement all of the processes were reviewed and improved or updated in some way. An example of a process improvement is in the warehouse where the procedures of work will change. Each package will have barcodes and less repacking will be needed (ERP Team Member). In the questionnaire there were strong support that “Most of the processes has been improved rather than redesigned from scratch” (Question 17, Appendix 6), and there was clear disagreement with the statement “Most of the processes has not been changed” (Question 18, Appendix 6).

An ERP team member meant that the purchasing process itself is difficult to make big improvements on, which led to limited changes and some steps were automated. Most improvements are in the administrative part of the process, not the physical flow (ERP Team Member). The reason is that the project is mostly internal, and aiming on improving the work processes rather than the physical flow. Everyone in the interviews said that less freetext order would free up time.

In the questionnaire there were support that the new processes were more cross-functional and spread opinions on whether the handovers in the new processes (indicating efficiency) were more or less, (Question 15 and 21, Appendix 6). There were solid support that the new processes would be more streamlined, faster and increase coordination between functions and that the planning would be developed with more transparency, (Questions 13, 2, 6 and 8, Appendix 6). An example of the more streamlined flow is that technical approval will be a part of the new purchasing flow (ERP Team Member).

4.3.2.3 Information sharing

The new solution leads to optimized maintenance planning and supply chain, including full visibility across rig fleet, according to several sources (Project Introduction; PETIL; Strategy Proposal). It will be higher transparency between the rigs, leading to increased cooperation (Materials Man). There will also be a possibility of benchmarking and knowledge sharing across rigs, reducing costs (Programme Structure; PETIL). The internal trade in MD will also be higher, with detailed and transparent information (Materials Man). Regarding the inventory, better information will lead to lower inventory levels and get an overview of what item that are located where in the new system (Materials Man; ERP Team Member)

4.3.2.4 Cross-functional

“A well integrated supply chain is core for our supply chain strategy” – Head of Procurement

Improving business planning and execution through increased availability, validity and flexibility of business process data was an important aspect (Programme Structure). A strong integration between finance, operations and procurement in the new ERP system was the intention (Strategy Proposal). Something which was supported by MDPRO and the ERP team, saying that purchasing would be more integrated with operations and maintenance to see the demands (General Manager Procurement; Chief Procurement Officer; Supplier Relationship Manager; ERP Team Members).

“The new system is a possibility to be more directly involved and getting more access to information” – Supplier Relationship Manager

4.3.2.5 Integration with customers and suppliers

The general manager thought that the new system would help to improve the data, leading to better overview and communication with suppliers to see what material that needs to be prioritized for MD. A heavier responsibility for data management is required. The head of procurement said that the communication with suppliers will not be affected very much, and the supplier relationship manager saw no closer relationship with the customers because of the new system. There was a unified support in the

questionnaire that the service to the rigs would improve. There was no support for that the customer would be more integrated, and only some support that suppliers became more integrated (Question 9, 11 and 12, Appendix 6).

4.3.2.6 Purchasing organization

According to the Chief Procurement Officer the system supports a higher centralization where visibility and transparency are important drivers. This view was not shared with the supplier relationship manager, who believed that the system would contribute to a less centralized organization and more people being able to do sourcing.

Regarding the centralization, one ERP Team Member meant that the system made the purchasing go from centralized to more semi-centralized. Another one meant that with the increased use of frame agreements, more purchasing would be in Manila with clearer specifications and that the procurement would not be more decentralized. An ERP member said that centralization level would stay the same. The questionnaire did not provide any clear opinions on the whether the organization would be more decentralized with the new ERP system (Question 5, Appendix 6). The approval matrix will not change from the current one according to a member in the ERP team.

4.3.2.7 Business process owner

The changes for the procurement department at MD will be big said the Head of Procurement. MD will now own all processes, and the supply chain will be more integrated. There is going to be more “end-to-end” thinking in the processes, the whole way from the identification of the need of an item until the delivery and use of an item. It requires that MD owns all processes and not just a part of them. One example is a transit warehouse where GPRO owns processes today, and the employees are from GPRO, but MD will remake processes and introduce changes. It is important however since the employees are hired by GPRO that they give feedback, so it does not become an organizational split. It can be done via MD visits to shorebases etc.

Most people in MD are affected by the change said an ERP member, except HR to some degree. The procurement member of the team meant that indirectly MD is already the process owner, so not much was going to change with the transfer of ownership, which was the view of several persons in the team. The title of BPO is mostly a formality, but it fills out a gap in the management system if MD owns all processes and it is easier said an ERP member.

Some processes were not described or mapped before, which was done in the project. They were designed from scratch, and it is three processes out of the ten main processes said the ERP team lead and an ERP member. Mostly the processes otherwise were improved, according several interviewees in the ERP team. The ERP team lead also said that with one system the processes will become more streamlined, and all of the processes more or less changes.

4.3.2.8 The new ERP System

The vendor saw the change from a systems perspective, the purpose is to go from an integrated silo system that MD has today, and instead all this should be integrated in one ERP system (Vendor Solution Presentation). New finance solutions were also needed to replace current outdated solutions (Project Introduction).

In the project there were five goals of the ERP system (Project Introduction):

1. Establish efficient, simple, uniform and cross-functional processes to **support strategy**
2. Improve usability; with special focus on offshore, support highest possible **user productivity** and efficiency and remove offshore latency
3. Support process integration with full information **transparency** throughout process chains
4. Provide **reliable**, accurate and flexible management reporting
5. Provide agile and uncomplicated **scalability** – efficient roll-out to new offshore units

The offshore latency was dealt with, by using a special solution from the vendor. An “Instant replication solutions” will be used to ensure that the data from the rig is sent onshore via satellite communication. The rig will have its own server, so the data can be stored locally, and when there is a good connection the new information is sent to the server on the land. With the solution, the people on the rig do not need to wait for the system to load, since the data is stored locally. (PETIL)

In the process designs, the vendor helped to minimize the customizations, according to an ERP team member. The new system is more standardized, and the buying will look more the same on the shorebases said two team members. Another important issue that was brought up was that the processes and the new ERP system gives success together, and that is why GPRO and the head of procurement has to agree to big process changes (ERP Team Lead). Generally the best fit possible between the ERP system and business process was the goal (ERP Team Member).

“The new system also removes the barrier between RFMP and ERPX, and offshore and onshore so less time can be spent looking for stuff” - Materials Man

In the questionnaire there was strong disagreement with the statement “The new ERP system does not fit with the Maersk Drilling organization” and that there would be disadvantages with fitting the business processes with standard ERP processes (Question 26 and 25, Appendix 6). There was no unified view on the process changes could have been done without the new ERP system (Question 19, Appendix 6).

4.3.2.9 Management reporting

All interviewees at MDPRO said that it would be easier to get an overview with reports from the system and spend visibility.

An example of the better overview is the handling of third party services. The general manager meant that the new system will reduce the spend on third party services (such as equipment rentals inspections etc.); since the items will be returned in time and it is possible to have an overview of the service contracts, (General Manager Procurement).

4.3.2.10 Data quality

The fact that there is only one entry of data will make the quality of data higher (PETIL). In order to get the synergies between offshore and onshore a cleanup of master data is required (Strategy Proposal). The reporting was also an important issue, where the new system contributed with better reporting to management, quicker and with correct data (Strategy Proposal). In the questionnaire (Question 10, Appendix 6) there was strong support that the data quality would improve.

The spend is going to be more clear in the new system, which gives an opportunity for deeper analysis said an ERP team member. Several members of the ERP team also said that the data will be better with one version of the truth, and that the master data owner needs to be clearer in the new system. It was supported by an interviewee from offshore, *“garbage in gives garbage out”*. Without qualitative data the new system can achieve little, which is one of the challenges according to a materials man.

4.3.3 Group Procurement

4.3.3.1 Processes and BPO

The change of BPO in the purchasing process, was not viewed as a problem said the KAM at GPRO. MD and GPRO needs to cooperate which should not be a problem, and MD is the client and GPRO has to serve its client. It was not considered a big challenge as long as GPRO is involved in the processes and decisions.

In the warehouse where GPRO has employees, it should be interesting to see how they handle the change since there are persons who have been working for twenty years at the warehouse, according to the KAM.

4.3.3.2 Purchasing process

In the specification phase, it will be easier to make sure that all rigs can use same standard material to drive up the purchase volumes (lead buyer).

The biggest change regarding to the supplier selection is that there will be better data on supplier performance, which is an important factor for

choosing the right supplier agreed both interviewees at GPRO. It can make savings for MD, with possibilities to consolidate buys and know what MD has bought before. Basic information is needed to have a baseline, to know where we are standing today (lead buyer).

The contract management will not be affected very much (KAM). In the interview it was found out that the purchasers spend about 20% of the time on expediting, to follow up and trace orders, and it is not considered a value-adding job. With the new system less time would be spent on expediting said the KAM.

4.3.3.3 Centralization

In the opinion of the KAM the ERP project would not be a big change regarding the centralization, even though the plan is to make it more centralized.

In the view of GPRO, the change that each BU in Maersk can have its own procurement system will create a more split IT environment for GPRO, since every BU has its own ERP system. The consequence is that it becomes more difficult to move employees in GPRO between purchasing for different BU's. Another issue is that in emergency situations, when it is a highly priced item, often a manager high up in the hierarchy has to approve the buy, and with several system all managers do not have access in all systems like it is today with RFMP. It might then be difficult to quickly get a hold of a person who can approve the buy stated the KAM.

4.3.3.4 Information sharing

That transparency will improve according to the interviewees. The transparency is important since there are long lead times and precise planning is required pointed the lead buyer out.

According to the lead buyer, there are lots of knowledge stored in people's heads across the organization, and it would be very beneficial to get that information into the system. It would make handovers easier.

4.3.3.5 Data quality

In the interview, it was found that the data quality was considered very important. This is the case since without good master data, it is not possible to see what was bought and information is lost. Master data should have its own team dedicated to make sure the data is good according to the KAM.

“If freetext orders are used again we are back on square one” – Key Account Manager

That the number of freetext orders will be lower was confirmed in the other interviewee. All in all GPRO seemed positive and the lead buyer said that the system covers many areas that are needed and it will open up for many new projects once it is working.

4.3.4 ERP Vendor

4.3.4.1 Purchasing process

The vendor expects a bigger part of the purchasing volume to go to Manila, because of a higher use of frame agreements. In the specification, the ERP consultant said that the goal is to use 100% material numbers, and no freetext orders, but a compliance of 80% - 90% usage of material numbers would be considered good in this project.

Regarding the supplier selection, the ERP system would support correct data and also the possibility to source from another rig instead of buying new material. A more detailed tool for supplier evaluation comes in the new system to see number of returns and wrong deliveries etc., (ERP Consultant).

4.3.4.2 Cross-functional

The department that is making demands for the material needed is maintenance, which is important to align with procurement. The interviewee also mentioned the connection with finance, which needs a structure to get the information on what is bought. The planning for maintenance will improve as the ERP system to makes sure departments are cooperating with each other, (ERP Consultant).

4.3.4.3 Data and reports

The software has to give the information needed to generate good reports. The quality of master data was perceived as a very important part said the ERP consultant.

4.3.5 Implementation Consultants

4.3.5.1 Purchasing process

The consultant stated that the fact that the new system will use more material numbers instead of freetexts minimizes the rebuying. The new system contributes much in making tracing of goods easier. The purchasing department will have detailed data on how they spend money, and can track the expenditures more precise.

4.3.5.2 Processes

The consultant estimated that about half of the processes will change. Out of the changed processes about 80% are improved and 20% redesigned from scratch (and with five changed processes that means one completely new). The new processes were considered more standardized with fewer people involved.

4.3.5.3 Centralization

The current purchasing process for the buyers in Manila will not change. The new system will make the purchasing more centralized with fewer persons will be able to place an order said the consultant.

4.3.5.4 Transparency

When going from several systems to one, it will create a lot more transparency. A big driver is the proper MRP function, which shares information between maintenance and purchasing. The information sharing between rigs will make it easier to supply materials and lead to lower inventories. The three-way matching will be easier with the new system, said the consultant.

4.3.5.5 Data

With the new system, more fields need to be filled in when purchasing and that improves the quality of the information according to the consultant. The quality of the master data was considered important, since without good quality no reorder points can be calculated and it is also needed to calculate demands from work orders, he said too.

4.3.6 Empirical summary table of changes

In table 2 the major changes that come with the new system can be seen.

Table 2 Empirical summary table of changes

Problem in the current state	How the new system will change it
<p>Purchasing process:</p> <ol style="list-style-type: none"> 1. Freetext orders creating extra work and costs 2. Not enough spend on frame agreements 3. Long lead times 4. Too many hours spent on expediting 5. No good data on supplier spend and performance 6. No joint MRP planning between operations and purchasing 7. Procurement where MD is not BPO of all processes 8. Low process compliance and difficult processes 9. Rigs are managed as independent units. No information exchange between rigs. 10. Waste in current processes 	<p>Purchasing process:</p> <ol style="list-style-type: none"> 1. Less orders via freetext with better catalog and one system. 2. More spend on frame agreements via better catalog and more standard articles will be used. 3. No big change on the physical flow but more efficient in administrative workflow. 4. Tracing orders will be easier with one system instead of split IT landscape 5. Improved data will help in evaluating, comparing and negotiating with suppliers 6. Joint planning available based on real-time data. Less emergency situations. 7. MD will own all processes, more unified from management perspective. 8. Simpler processes that are easier to follow and more standardized

	<p>9. More information sharing centrally and between rigs. Better inventory overview and availability.</p> <p>10. More efficient and streamlined processes. Efficient warehouse operations leads to lower inventory.</p>
<p>ERP system:</p> <ol style="list-style-type: none"> 1. Uncoordinated IT landscape with several systems that have duplicated data 2. Low quality of data 3. Latency on the rigs 4. Current ERP system not supporting growth 5. Poor usability, the personnel working in the system have different ways of working. Only few persons with deep knowledge in current system. 6. Insufficient management reporting and poor overview over contracts 	<p>ERP system:</p> <ol style="list-style-type: none"> 1. One ERP system with transparency 2. “One source of truth” in one system (one point of data entry) leads to higher data quality. 3. Server on the rigs reducing latency 4. New ERP system will be more scalable 5. More user-friendly interface 6. MD will own their own data, easier to pull out reports from the new ERP system. Better overview over contracts.

4.4 Challenges

Before the benefits of the new processes can be achieved the transition between the current state and the future state has to be made. The change of processes and ways of working presents numerous challenges. Finally we will describe how Maersk works with these challenges today.

4.4.1 Maersk Drilling

MD conducted a risk assessment report in early 2013. In total there were over 150 risks considered in the report. Risk workshops were held to discuss risk strategies and mitigating risks and preventive actions for the ERP project (Risk Assessment Report).

In the risk report, the classical approach with “risk = impact x probability” was used. There were several categories including: interface, migration, offshore units, project management, post go-live, requirements resources, safety, solution design, testing, training and Group Procurement catalog. (Risk Assessment Report)

The fact that MD will grow fast was not the case when the project started according to a person at MDPRO who also thought that the rollout would be tough.

“Maersk Drilling is under pressure at the moment. We are facing new challenges in new areas that are incredibly demanding” - General Manager Procurement

Table 3 on the next page illustrates the challenges that the respondents could rank from 1-5 with 5 being the highest challenge and 1 being the lowest challenge. The answers are divided upon the different stakeholders and the average is on the bottom line. The highest value that any challenge can attain is 5 in our ranking. As seen the rank is, with the biggest challenge first:

Table 3 Table of rankings of perceived challenges

Actor	Technical issues like master data	Requirement not covering business needs	Challenge of change	Business involvement not enough	Top management support
ERP team Procurement and SCM	3,75	2,75	3,5	2,75	2,25
Group Procurement	3,5	3,5	2,5	3	2,5
MD Procurement	5	1,5	3,5	3,5	1,5
Vendor	5	1	4	3	2
Consultants	5	3	4	2	1
Offshore	3	4,5	3	3	1,5
Result	25,25	16,25	20,5	17,25	10,75

1. Technical issues like master data
2. Not taking challenge of change into consideration
3. Business is not enough involved leading to wrong design of solutions
4. Requirements not covering business needs
5. Weak top management support

The selection of these challenges was based on theory, a risk report from MD and the pre-study when talking to people.

4.4.1.1 Challenge of change

When talking about CM it is important to remember that when the study took place, the implementation had not started yet.

The second biggest challenge in the questionnaire was “Not taking the challenge of change into consideration”. In one presentation to the Petroleumtilsynet (PETIL, a government regulator for the Norwegian petroleum industry) change management was considered a major challenge. Challenges of not understanding the need of a new system, insufficient training in the new way of working (leading to efficiency and benefit losses) and lack of buy in from shorebases, management and

vessels can lead to problems (PETIL). In the risk report "Organizational fatigue due to a number of changes and effort required to implement and train the users" was one of the top five risks. It was approached by a CM strategy and dedicated resources, focus on communication and follow up on risks, (Risk Assessment Report).

A change management strategy was therefore developed (PETIL):

1. Communication strategy – identifying pain points, creating targeted responses and having a 2-way communication
2. External stakeholder engagement – Identifying parties, derive objectives for the parties and defining timing of involvement
3. Training strategy requirements – Define training requirements and align the communication plan.

A member of the team pointed out that a major part of the project is about change management, with the culture of the rigs in mind.

"From experience with earlier change projects, I know that it is depending much on how the material man is, if he is open to change or not" – ERP Team Member

An approach to deal with it is to make the one with extensive ERPX knowledge as super-users in the new system. They then get to educate other users in the system which makes them feel that they still have "power" and knows how the system is working, (Materials Man). It was supported by an ERP member who said that some persons have extensive knowledge in ERPX, and that they think that their jobs are secured by that knowledge.

"The fact is that many employees have deep knowledge in today's system, and when you change system you pull away the carpet under their feet" – The Materials Men

Changes offshore

The head of procurement said that the people in HQ hears about projects and what is going on all the time, which is not the case on the rig. The "office people" are more aware of what is going on in the MD organization

while the offshore staff has high focus on the operations of their rig and do not get in contact with the HQ as often. Hence the higher resistance of change will be at the rigs since they have their own priorities.

And that the personnel offshore are tough and more prone to resistance were indicated by several ERP team members. The risk with change is also myopia according to one of the interviewees as people tend to only see their part and do not have a holistic view and changes always lead to resistance stated the team lead.

One materials man pointed out that when dealing with change management offshore, it depends much on how the attitude is from the person onboard. If it is a person who is willing to adapt it can go very smooth, after two weeks and the new materials man arrives and he might not be very change oriented. The solutions are involvement and extensive training.

4.4.1.2 Teams

In the risk report, “Failure to achieve alignment of cross-functional solutions i.e. TO, Procurement, Project Cost Control, Operation, Finance solutions” was one of the top-five risks. MD Approached it with having a BRG to agree on cross-functional solutions. The guiding principles were defined cross-functionally and key solution workshops are held cross-functionally. (Risk Assessment Report) The questionnaire, (Question 22, Appendix 6) gave strong support to that the ERP project had a good mix of people from different functions.

All of the interviewees in the ERP team including those with offshore experience were saying that the team had a good mix of people with different experiences. The earlier experiences included other ERP projects, working at GPRO and academia, which made the mix very good. More people from offshore could have been involved thought a member in ERP which was supported by a materials man. A challenge is that not all parties are involved, and what is required is that the leaders need to embrace it to ensure full governance and compliance said a member in MDPRO.

4.4.1.3 Processes

The ERP team lead thought that it is very important to look at how the processes affect each other, since many processes are intertwined. An example of this is the three-way match. If something changes, the risk is that it affects other processes as well.

Getting the people on the rigs to actually follow the standardized processes was perceived as a challenge, and it is important to make the system as foolproof as possible (ERP Team Lead).

“If the new processes are easy then they will probably be followed” –
Materials Man

In the design of the solutions it can be important to have the business involved. According to the risk report “Business not involved sufficiently in design resulting in wrong solutions” was in the top five challenges, and the third biggest in the questionnaire. It was approached by a detailed design plan with early BU involvement. BRG approval of design and functional solutions. Detailed workshop plan for main process workshops were set up. (Risk Assessment Report).

4.4.1.4 ERP designs

In the risk report, “Overworking the designs making the program complex and too customized. Minimal Customization” was one of the top risks. It was approached by “Striving for acceptance of standard functionality whenever possible. Strong focus on change procedures.” A process for change requests was established and approved. (Risk Assessment Report). In the interviews the overall orientation was to use standardized process as much as possible.

4.4.1.5 Organizational challenges

The Head of Procurement pointed out that there is a risk of an organizational split in the change of BPO in the purchasing process; we need a close connection with the purchasers who work every day in the processes.

4.4.1.6 Top management support

The fifth biggest challenge in the questionnaire was “Weak top management supports” which was by the interviewees ranked as the lowest risk. That the top management had been strong was strongly supported in the questionnaire (Question 16, Appendix 6).

The top management support is good with the CEO being in the steering committee and visiting ERP meetings, according to all the persons interviewed. The general manager said that procurement get the resources they need from the project, supported by a materials man. One example of was that the project needed more time and resources were given to go on for six months longer.

There are many mid-level managers at Maersk and it is not always sure that their version of the truth is the same as the intention of the CEO. It takes time for a message to go from the top to the bottom of the pyramid. Mid-level managers hands on their version of the message, (Materials Man). It can contribute to the communication towards the offshore personnel being a challenge.

4.4.1.7 Urgency

There is an urgency to get the benefits of transparency and visibility, but the project should not be pushed at the expense of the quality. People do have high hopes for the system, stressed the head of procurement in the interview.

There is a high focus on the project, said an ERP team member. The fact that the size of the fleet is doubling makes it urgent, and buyers are optimistic stated another one. There is urgency from the steering committee, but they still want quality, according to several members of the ERP team.

4.4.1.8 Vision

When asking about the vision, there were several versions presented. Many had keywords such as “transparency”, “visibility” and “effective processes”, but there was not a unified vision. The vision is to have one system according to the head of procurement. The vision was

communicated as reducing overheads and increasing visibility and transparency according to an offshore interviewee. The vision is about traceability, visibility and more streamlined and effective processes (ERP Team Member). Another ERP team member says that the new system is about removing offshore latency, visibility, transparency and sharing data.

A person at MDPRO said that the vision is somewhat unclear and that it should be communicated better. The communication approach must be more aggressive, and make the ERP project come to “top of mind”. The questionnaire (Question 23, Appendix 6) gave strong support to that there was a clear and understandable vision in the project.

4.4.1.9 Communication

In the presentation the ways of communicating were presented: video, power points, intranet, invitation to ERP office, visits to rig/shorebase/warehouse, seminars and answering questions via mail, PETIL, (ERP Team Member). A problem is that the information tends to be neglected offshore, according to a materials man. The communication works quite well, and it is important to send operations people to the rigs for the communication who understand the language and needs of the rig personnel. The change should also be communicated to others in Maersk, not only inside MD (Head of Procurement). Inviting stakeholders in processes to be able to affect the designs and having workshops has been done as well, (Supplier Relationship Manager). The end users must be involved and visited. Leaders from Manila are already involved, but the experience from other projects is that it is better to wait with the communication until the implementation is there stated a member of the ERP team.

A person in MDPRO said that a “need for the system” had to be created. Maybe involve someone from marketing into the project that can communicate it. It is a big project so the communication efforts should be big as well.

The communication offshore is tricky, since about 5% of the people working there have intranet access according to an ERP team member.

Another ERP member said that heavy emphasis has to be put on communication, just because people are reading the brochure does not mean that they are positive to change. To really get the message through, there needs to be physical interference out on the rigs with meetings and workshops. One of the ERP team members, said that there could be even more communication to stakeholder. Many of the interviewees talked about the difficulties in reaching out to everyone, and that a lot of people knows the old system very well and not prone to change.

4.4.1.10 Requirements

In the risk report “Requirements not covering business needs” was one of the top risks. MD had approval process established in relation with BRG to secure approval in time with right level of involvement. The software vendor challenged business requirements in upcoming workshops. Cross-functional areas covered in workshops. (Risk Assessment Report)

According to the Head of Procurement the process of collecting the requirements on what the new system should deliver, was not optimal. The range of requirements was wide and there was no clear specification of what a requirement was. The descriptions are very different, and more time should be spent going through the requirements and make sure they were aligned with each other and the needs of the business, (Head of Procurement) The view was supported by a member in the ERP team, stating that there had been over 1900 requirements. The general manager also thought that there were many “wish lists” in the requirements phase, and many of the requirements is actually fulfilled in today’s system. In the challenge rank “Requirements not covering business needs” was perceived as the fourth biggest challenge.

4.4.1.11 Data quality

The number one challenge in the questionnaire was “Technical issues like master data”, which over 68% of the interviewees perceived as the biggest challenge. One of the challenges is all the education needed and data quality is a challenge too (General Manager Procurement). The benefits will

not be there unless we have good master data, said two of the interviewees at MDPRO.

According to several ERP team members there is a risk of loss of data in the implementation. The migration is a huge project, and not all are aware of the work needed. For example a rig has 10 000 locations, which needs to be put in from scratch. The risk is quality sacrificed for speed in the data migration.

The data transformation is considered a challenge by both of the interviewees, since often old information is used when working as a materials man. But one says that the data is a challenge that can be solved. There was no clear view on the understanding of IT across the Maersk organization according to questionnaire (Question 27, Appendix 6).

4.4.2 Group Procurement

4.4.2.1 Challenge of change

Staff from GPRO has been to the rigs and continuously works with offshore personnel. The KAM thinks that there will be resistance in the warehouse in Esbjerg. The persons there have worked there for a long time and it is not easy to just change routines and ways of working. In Copenhagen people are more involved, the purchasers look forward to the system. The lead buyer emphasized that people who before were skilled users in ERPX will become beginners, which is a big challenge. Lots of training is needed to reduce the resistance. The lead buyer has himself been involved in ERP projects, and he said "The first three-six weeks will be a nightmare".

4.4.2.2 Top management support

The project has clearly a good support, the management are doing a great job in this (KAM).

4.4.2.3 Team

The teams are very well selected, diverse, and they have good teamwork agreed both interviewees at GPRO.

4.4.2.4 Urgency

From a company perspective the project is urgent, it is needed to reach the goal for Maersk “to be leading in everything we do” (KAM). The lead buyer says that for him it is not very urgent but “the sooner the better”. In his opinion quality is important.

4.4.2.5 Vision

According to the KAM, the vision is to become more efficient.

4.4.2.6 Communication

The communication from MD about the project has been quite low. GPRO as an organization is not really involved in what is happening within the new ERP project, agreed both interviewees at GPRO. The lead buyer said he is travelling a lot and is very busy, so he do not have time to worry about he system until it is for real.

4.4.2.7 Data quality

A challenge mentioned is the quality of the data. The ERP team has to make sure that the new system collects all data and the old data gets transferred properly, such data is important to have for the purchasers. In the transfer period with GPRO running two ERP system the data reports might suffer as not only one report tool is used and purchasers might not see the total spend in one tool, according to the KAM at GPRO.

4.4.3 ERP Vendor

4.4.3.1 Challenge of change

The ERP vendor consultant said that it takes time to convince people of the benefits with the new system. From his experience persons has to be convinced about the benefits before they are willing to work to get them. “People are lazy and skeptical by nature”. The ERP team has moved from being a little skeptical to be very enthusiastic. An important aspect is to involving people early in the project, and “anchor” the changes with them to get feedback. (ERP Consultant)

In the implementation phase, it is important to avoid risks with information to the users, taking help from the end users and teach the users (not a top-down approach), stated the ERP consultant.

4.4.3.2 Top management support

An important sign of the top management support has been the involvement of the CEO, he is there at kickoffs and other events, (ERP Consultant).

4.4.3.3 Urgency

MD needs extended support in their business to be competitive and to be able to take good decisions, so the project is quite urgent, (ERP Consultant).

4.4.3.4 Communication

The communication has been very good in the project (ERP Consultant).

4.4.3.5 Data quality

It is important to reduce the amount of articles in the master data and get articles with correct data. A challenge is that the users enter wrong data in the new system. Correct and precise data is vital to get the full effect of the new system stated the ERP consultant.

4.4.3.6 ERP challenges

It is important for MD to have a good cutover plan, which takes up the activities before, during and after the implementation, said the ERP consultant. It is common in the oil and gas sector to implement site-by-site, since it is possible to learn from the mistakes in the first roll-out when the first rig gets the new system. One of the challenges is for GPRO and MD to run the business with several ERP systems at the same time, which is the case during the rollout. The communication between the systems during the period of change is difficult. (ERP Consultant)

4.4.4 Implementation Consultants

4.4.4.1 Communication

The consultant stated that it is important to explain the benefits for the people offshore, it might be extra work, but the offshore people have many benefits with the new system as well. MD needs to have short communication, to quickly show benefits, and variety of formats. When the interviewee compared the project with similar ones, the Maersk project is very good in the communication so far. The communication should be simple and in a variety of formats.

4.4.4.2 Top management

The top management support in the project is excellent, according to the consultant.

4.4.4.3 Data quality

The consultant said that the data quality is of huge importance and it has to be correct to be able to calculate re-order points and demand. The master data is linking demand and the work order, which is enabling purchasing collaboration.

4.4.4.4 Project management

The scale of the project is a challenge in itself. Over half of the total project team of 80+ people do not have experience from big ERP projects. The size also means that delays are very costly. It is difficult to see what everyone is doing, and while developing the new processes there are a lot of decisions that needs to be taken care of by someone who knows the business, according to the consultant.

4.4.5 Empirical summary tables of challenges

Table 4 Empirical summary table of challenges

Challenge	MD	GPRO	ERP Vendor	Consultants
Challenge of change	Very important challenge. Emphasized the difficulty of changes offshore.	Big challenge but lower rank than other actors. Educating personnel with deep ERPX knowledge will be tough.	Very important challenge. Have to communicate and show the benefits for users.	Very important challenge. Need to show benefits for users.
Business involvement in solution design	Good business involvement with workshops and invited end users.	GPRO has given input in solutions designs. Not as big challenge.	Not the biggest challenge but important.	Not a major challenge.
Requirements	Big challenge since the requirement collection	Big challenge.	Not a big challenge but requirement are sometimes strict, making it tough to work solution-oriented.	A challenge, but not the biggest.
Top Management Support	Very good with CEO involvement.	Great, no big challenge.	Good with CEO involvement.	Excellent, no big challenge.
Technical issues	Biggest challenge! Start from poor data and lot of migration needed.	Transfer old data properly is big challenge. Running two systems at the same time is a big challenge.	Challenging to run with several systems during implementation.	Biggest challenge! Starting from low level.
Mixed teams	Good mix, except maybe someone more from offshore needed in ERP team.	Well selected diverse teams.	Very good mix!	Good mix.

Process compliance	Working with involved end users, and better user interface, not a major challenge as long as the new processes are easy.	Difficult to change how people work in warehouses, they are used to work in their own way.	Involving users is very important, good with visits.	High user focus in MD, and not only IT focus which is common. Develop new processes together with users.
Communication	Good with several formats. Very challenging to reach offshore employees due to high workload and limited communication.	So far not much communication with GPRO. Challenging with rigs.	Very good so far, ambitious compared to other projects. Takes communication to convince people.	Challenging but good so far comparing with other projects. Good with short communication in variety of formats.
Urgency	Tough to balance time limits and quality, but high focus on project.	Not very urgent for purchasers, have other things to work with currently.	Urgent project, need system to compete in the market.	MD need benefits that comes with the new ERP system.
Other	Intertwined processes is a challenge when changing in one process that affect others.		Important with a good cutover plan in the change of systems.	The size of the project with 80+ people involved makes it challenging.

5 Analysis

In this chapter the empirical data will be compared with the theory. The analysis will handle the research questions and relate to the changes and challenges concerning the procurement and SCM processes.

5.1 Changes

In the procurement and supply chain area several activities are affected by a new ERP system. As Mentzer et al. (2001) points out the activities and functions in a supply chain have to be coordinated to make the supply chain reach its full potential. The previous way of working at MD has been with functional silos where integration and transparency has been diminished due to the split IT landscape and the organization. IT has not supported the strategy of MD, where the goal has been to plan for accelerated growth. MD started the ERP project because they needed business development and not just IT and ERP. Nah et al. (2001) mentions integration, automation, transparency and real-time information as some of the key attributes in an ERP system. MD needs to ensure that the changed processes and systems will be adapted so that they can accommodate such a strategy. See the summary table in 5.1.8.

When talking about changing and improving processes it is in order to enhance the organizations business performance (Singla, 2008). The goals involved in changing the processes are to eliminate waste, improve productivity, optimize existing resources, handle growth without adding resources, and streamline existing operations (Ljungberg & Larsson, 2012). This is in alignment with the goals of MD and they say that the procurement and logistics processes should be challenged towards simplification, efficiency, cross-functionality and support the strategy.

5.1.1 Fitting the processes with the organization

MD is striving for acceptance of standard functionality whenever possible but too much standardizing and accepting best practice processes is not business differentiating and could harm the competitive advantage of MD. We therefore believe that it is good to customize modules in the ERP

system to a certain degree. As an ERP system must be designed to support one or more processes, it is important that the processes are mapped and evaluated to avoid that inefficient processes are building the ERP system (Sandoe, 2001). This has been done thoroughly at MD and each business process has been analyzed. A process flow has been developed, and the inputs, processes, and outputs have been documented. The process flow becomes an excellent tool to identify waste in a process.

It is also important to remember that the vendors are not experts in the business of MD. As Pollock (2004) suggests, the vendor can learn from the client, which has been the case with MD where the vendor developed some new solutions based on the new experiences at MD. Suggestions and advices are always good but MD must take the final decision on whether best practice is in the favor and creates the extra value for them. In the interviews, it was often not considered a problem to fit the system with the organization. The researchers believe that it is more important to fit the business requirements with the solution design, since the ERP system is modularized. According to the respondents it is a good fit (Question 26, Appendix 6), which is an indication that a proper pre-study has been done and that the customization is adapted to MD's ways of working.

Today MD has very different processes on the different rigs and as the business continuously develops the processes needs to be standardized in order to make the processes mobile and scalable. Respondents told that personnel on the rigs often follow the easiest procedures possible. If working in the new system is easy, the processes will be followed and if it is complicated they will find ways to get around it. Without standardization it can be harder to grow with the new processes and also to implement them in other business units.

Most respondents shared this view (Question 15, Appendix 6) and this is also in line with the internal data where standardization is a guideline principle. This will ensure that the system can be easily upgraded for future versions and scalability to support the future growth as MD intends to increase the number of rigs in their fleet. This means that MD will be supported by the new system for some time to come.

Therefore it has been an explicit focus from management to unify the users' processes instead of allowing the users to customize the way they work so that the business becomes too dependent on them. Many interviewees thought that the user interface was easier with the new ERP system, which will lead to higher process compliance.

There were different opinions on how much the processes were changed. One team member stated that "Procurement is procurement, not much changes" but still most processes will be changed in some way, and in the SCM track, one out of the total ten main processes were designed from scratch. It was a completely new process for "Master Data Management" which is good since this is perceived as a big challenge. The consultants pointed out that most processes were improved. In the questionnaire this view was mostly shared (Question 18, Appendix 6).

The fact that out of the original nine processes five were improved shows that a new ERP system can be a trigger to optimize and improve the existing business processes in a company. Using IT to improve business processes is in line with Singla (2008) and Grover et al. (1995).

5.1.2 Purchasing process

The major changes within purchasing processes involve increased usage of the catalog of standard articles, improved data for the choice of suppliers and more use of frame agreements.

There are several similarities with the theory in the improvements with an ERP system regarding ordering, expediting and evaluation of suppliers.

Specification

A major part of the new ERP system was to make it easier to order via a catalog and increase the use of standard articles. Reducing time and minimizing errors in these processes are both factors that will change when decreasing the freetext orders. This is largely depending on improving the master data, which is perceived as an important part of the project by all respondents (see more under 5.2.1 "Master data"). With the new system the material numbers will be used more frequently and it will decrease the risk of misinterpretation. Studies (Velcu, 2007) suggest that ERP systems

can lead to lower administration costs and more transparency. In the case with MD less communication will be needed between the materials man and buyer on the shorebase to specify the item to be bought, which lowers administration costs.

Supplier selection

Improved data in the system, such as spend and on-time deliveries, will automatically lead to improved supplier selection. If the purchasers can follow the consolidated spend from each supplier they will have more detailed information to use in negotiations and can be used as leverage leading to cost savings. These are indirect effects from improved supplier evaluation, which is in accordance with LaFramboise and Reyes (2005). The supplier selection itself is not directly affected by the ERP system. Higher use of standard items means that fewer suppliers might be needed of standard non-technical material. Considering the nature of the oil and gas sector, it is tough to reduce the broad supplier base of technical material.

Contracting

A part of the goals with the new system was to increase the supplier contract coverage and compliance. By using frame agreements the contracting process will be more efficient as it before was low coverage of agreements causing the purchasers to send many request for quotations. Increased use of standard articles from the catalog helps in increasing use of frame agreements. In the questionnaire it can be seen that many respondents were neutral or did not answer, which suggests that the effects on contracting are not prioritized and that there is no major impact. The researchers also believe that there are indirect effects from detailed data, to easier see to which degree the contracts are used (Question 1, Appendix 6).

Ordering

The order process will be more efficient and faster with the new ERP system. This has been the major point of improvement as it before was complicated with the split IT-landscape where ERPX and RFMP lacked the transparency and integration that was required. Offshore ordering could take several hours per day just waiting for the system to response and the

latency issues will be resolved with the new server solution leading to major improvements in the ordering process. The problem with latency is industry-specific and not encountered in the studied theory. The solution from the vendor with a server on the rig that reduces the latency is something that probably would be beneficial for other companies in the oil and gas industry.

In accordance with the theory, planning will be based on the same real-time data (Hendrick et al., 2001; Velcu 2007; Nah et al. 2001), which means that ERP systems can produce and access information in a real-time environment. This entails that the number of “emergency orders” will decrease, leading to lower costs and a less stressful work environment for the employees. It will be simpler for the buyers to take the long lead-times in consideration when ordering, and increased cooperation between maintenance and procurement functions. In the ordering some steps will also be automated and less time spent on the ordering process (Question 2, Appendix 6). Automation is supported as a benefit with ERP from Nah et al. (2001).

Expediting

The follow up situation will be more expedient as the offshore personnel will be able to monitor and track the goods with the new system (Question 3, Appendix 6). Rejects caused by incorrect communication of product identity and quantity will be minimized. From the interviews the purchasers and materials men both said that too much time was spent on tracking down orders, and getting information on the status of an order. Less time spent on this will lead to lower administration costs, which is in accordance with Velcu (2007) and possibility to spend more time on value-adding work.

In the theory, decreased lead-time was often mentioned as an effect of a new ERP system (Hendricks et al., 2001). The lead-times were not mentioned very much in the interviews, but it was one of the goals in the ERP project, related to SCM, to reduce them. Many of the interviewees noted the importance of planning due to long lead-times. Considering the importance of reducing lead-time (Persson, 1995) and that shorter lead-

times often means less inventory and lower waste, it is noticeable that MD is not more focused on the decreasing of their lead-times, especially since the standard is 90 days. As the implementation consultant mentioned, MD has no good data on the lead-times today, which may be the reason for not focusing on them. It would be a big benefit for MD to not only focus on the benefits with planning (which is needed because of the long lead-times), but also to reduce the internal lead-times and get to the root of the problem. The process changes will not affect the external lead-times from the suppliers.

Evaluation

This part is similar to the supplier selection process, as it also will be improved with the increased information (Question 4, Appendix 6). The problem currently is poor data, which makes it tough for the procurement to know their spend and how the suppliers are performing. Detailed data makes it easier to do a supplier performance measurement with regards to on-time deliveries and quality as this information will continually be used as input. Enhanced reports and deeper analysis will thereby lead to enhanced evaluation of the suppliers, which was strongly supported in the interviews. The improved evaluation of suppliers with a new ERP system is supported in theory by LaFramboise and Reyes (2005).

5.1.3 Information sharing

Many of the processes could have been changed without the ERP system according to some of the respondents (Question 19, Appendix 6). It is however not sure whether if these processes could have had the same impact on efficiency and benefits as the ones from the ERP. For an example many of the new processes, such as ordering and monitoring, are dependent upon information sharing with transparency and traceability, which could not have been attained by only improving the processes in terms of minimizing handovers and streamlining them.

Mentzer et al. (2001) mentions that sharing information is vital to make the supply chain reach its full potential and to coordinate business functions. The general opinion about sharing information from the empirical data was that one system will lead to an improved overview. Increased internal

information sharing between operations and procurement leads to improved planning and monitoring of goods, which is in line with Lee et al. (1998). These aspects are closely connected to the up-time and the questionnaire supported that the service to the rigs will improve, which is important to reach high up-time.

The service to the rigs includes the forecasting of the demands, and there are also safety regulations requiring critical parts to be stocked. Uncertain demand leads to buffers, and this holds true for MD as well that lower inventory means much freed up capital (Hill & Hill, 2011). ERP can often help to bring the inventory level down (Damijan et al., 2009; Velcu, 2007). The view from the empirical data was that there will be lower inventory because of improved information. Increased transparency leads to internal trade and increased availability. The increased internal trade is probably a bit specific to the industry, but important since the technical parts are very expensive. Increased availability of parts will help to keep a high up-time for the rigs, which was supported by the questionnaire.

Another significant change with more information sharing for MD is the fact that the expediting and specification will be less time consuming and the sourcing from internal rigs and warehouses would be higher. The improved planning leads to less firefighting and increased control over what is happening.

The theory also suggested that an improved process management would mean more possibilities to share practices internally (Nah et al., 2001). Sharing practices was not discussed much in the interviews, but it is a good possibility. MD has rigs in several places in the world and they often work in different ways. Standardized practices make it easier to move drilling personnel (suitable since they are in short supply), and the learning curve for an employee when changing rig can be shortened. Shared best practices probably also means improved performance across the fleet.

An example of better overview is the third party services which will be easier to overview, to make MD hand in rental equipment in time and see the contracts. The fact that it is big sums involved (40% of operations

spend) means money to be saved. It is in line with the general statement (Rentzhog, 1998) of that an ERP system leads to better process management.

5.1.4 Cross-functional processes

MD has been clear in the importance of working more cross-functional and the guidelines have been towards this as well. Cross-functionality is important to move across functional boundaries as suggested by van Ackere et al., (1993). The information systems must support cross-functional processes rather than only focusing at departments (Hammer, 2007). At MD today the rigs have been managed as independent units since offshore and onshore has been in divided IT landscapes. By using one system the coordination between purchasing, finance and operations will improve which has strong support in empirical data. This will include reduced handovers and from the questionnaire there was strong support that the new processes will become more streamlined and faster (Question 13, Appendix 6). Whether the number of handovers was reduced in the new processes was not totally clear in the survey, which could be because the same people and departments are still involved (see figure 24). However, the amount of mail and phone communication will be reduced.

5.1.5 Supplier and customer integration

In the guidelines from the internal data it is also stated that the process integration should support the entire value chain from customers to suppliers. This is something that the respondents were divided upon and there were different opinions about this (Question 11 and 12, Appendix 6). The general manager thought that the new system would help to improve the data, leading to better information about suppliers and customers, in order to see what material that needs to be prioritized for MD. Some members in the ERP team did not share this in the questionnaire and other stakeholders were neutral to the statement that suppliers will be more involved with the new ERP system. That is the case since the project is to a high degree an internal project at MD, and there are no direct new links to the suppliers with the new ERP. The effects of the systems to suppliers (more detailed data for evaluations and negotiations) are mostly indirect.

Hammer (2007) says that the more mature a company is, the more natural it is to work cross-functional. In very mature companies, it is natural to work with customers and suppliers in teamwork. According to Hammer, MD is doing the right thing, by first getting mature internally and work process-oriented and cross-functional. MD is on the right way, and after they are more mature internally they might start integrating customers and suppliers more.

5.1.6 Procurement organization

ERP is a centralized application architecture in principle as well as in concept. It is a great model for standardization, using economies of scale and improving expertise of the staff (Droge & Germain, 1989). It was never designed for decentralized business architecture. The head of procurement said that the new system will change to support a more centralized system where visibility and transparency are important drivers. All respondents did not share this since some respondents believed it could lead to a situation where more people could send requisitions and thereby it would support decentralization (Question 5, Appendix 6).

The relationship between MD and GPRO is probably what causes the confusion about centralization, but if we only look at a perspective from MD the procurement is quite decentralized (see Question 5, Appendix 6). Since the rig managers needs to approve the purchase, MD has tight control over the purchase process. If the purchasing process is viewed from GPRO, they have purchasers working closely with the rigs, but decisions needs to be approved centrally, which make the purchasing centralized. The approval matrix will not change, which means that the new ERP system is not affecting the centralization very much. The utilization of the outsourcing to Manila will increase with the new catalog, and that is not viewed as a challenge.

Even if the stakeholders had different views on this, our opinion is that the new ERP system will make it a bit more centralized for both parties, as the system will ensure a uniform approach with shared data, buying-policies and frame agreements. This centralization leads to some form of

coordinated purchasing and this is the goal for MD as they want to reduce the freetext ordering and thereby it will be more controllable of who actually does the procurement. The catalog and less freetext orders support centralization, as well as fewer people being able to do purchasing.

An important aspect is that MD does not have any official procurement strategy. Different degrees of centralization support different strategies (Glock & Hochrein, 2011). Low cost strategy is supported by high centralization and differentiated strategies are supported by decentralization. Hence it would be beneficial for MD to have an official procurement strategy to see which direction their purchasing organization should develop in. If the researchers would look at MD today, with their high focus on up-time they are clearly pursuing a differentiated strategy. The decentralization is high today and the level of coordination in procurement between rigs is very low so the increased centralization from the ERP system is very beneficial for the procurement department and GPRO. For large companies such as MD this can derive the greatest benefits by harnessing on economies of scale and coordinating the purchasing between the different functions and rigs.

5.1.7 Business process owner

The change of business process owner (BPO) will make MD in charge of its own processes. As MD wants to become more process-oriented, this is an important step to take according to the Head of Procurement. Changing BPO is by some respondents considered as a formality, since MD is the customer and can strongly influence how GPRO operates. According to Rummler and Brache (1991) a process owner without clear ownership will lead to a state where the functional structure will continue to dominate. Caron et al. (1994) also states that the people who work in the processes should own them, as it otherwise is a higher risk of failure.

Important for MD is to stay involved with GPRO, to ensure that they work closely even though they are different organizations. This means a higher responsibility for MD and incentives, management, routines and rules needs to support the ownership according to Rentzhog (1998). In order to

get full support in the process ownership, MD has to make sure that the people hired by GPRO has the same incentives and structure as MD personnel.

5.1.8 Summary table of the analysis concerning changes

Table 5 Summary table of the analysis concerning changes

Topic	Analysis		Comment
	Theory	Empirical conclusion	
Changing processes	Reducing complexity and number of handover makes a process simpler. IT is a good enabler for reengineering. The organization has to learn from successes and failures.	The new processes are more streamlined, faster and supports effective use of resources. The processes are more standardized and cross-functional.	The ERP system has been a clear enabler for changing the processes. Site by site implementation makes it possible to learn what works. Processes has become more streamlined, standardized, cross-functional and efficient. There are still the same departments and people involved, organizationally the purchasing process has not changed much.
Fitting the organization and the system	Standard solutions is preferable and it is easier to adapt the business processes to the system processes However, processes that differentiates the competitive advantage are important to keep	MD has mapped their processes to see where the possibilities for improvements are and then evaluating whether if the new system could support it. If they could not they customized the system to fit with their business processes. Standard functionality was strived for.	MD has a good knowledge of what should be customized and what should be standardized. By mapping processes and having a close collaboration with vendors and consultants this challenge has been minimized.
Purchasing Process 1. Specification 2. Supplier selection 3. Contracting 4. Ordering 5. Expediting 6. Evaluation	1. Not mentioned 2. Better selection because of step 6. 3. Not mentioned, proposed for further research. 4. Lower administration costs 5. Decreased lead-times, less time spent tracing goods. 6. Better supplier evaluation	1. More use of standard articles (catalog) leads to standardization. 2. Better data will make supplier choice better. 3. More contract compliance with more use of frame agreements 4. Faster and more efficient order process 5. Easier to trace goods 6. More data and reports → better and easier evaluation	The major changes involve using the catalog of standard articles more, more data for the choice of suppliers and more use of frame agreements. There are several similarities with the theory regarding steps 4,5 and 6.
Information sharing (planning)	Easier tracing with information sharing. Better process	One system leads to better overview. Better information sharing between operations	Similar results as the theory suggests regarding overview and tracing. The information

monitoring and tracing goods)	management. Share practices. Lower inventory and higher turnover can be achieved	and procurement leads to better planning and monitoring of goods. Lower inventory because of better information. More transparency leads to internal trade and higher availability.	sharing regarding planning is a significant change for MD. The interviews and archival data yields similar results in the MD project as the theory suggests that ERP helps in lowering inventory
Cross functional processes	IT should support cross-functional processes. Needs strong support from top management.	Rigs are independent today. Empirical data supports that the processes will be more cross-functional and that planning will be improved. Increased alignment between procurement and maintenance.	The ERP system supports cross-functionality. MD has strong support from top management, will be more cross-functional.
Integration with customers and suppliers	Improved customer service. Better performance from suppliers.	The integration with the suppliers and customers will not be changed much with the ERP system.	The project is to a high degree an internal project at MD. Indirect effects of the systems to suppliers (better data for evaluations and negotiations).
Procurement organization (centralization)	Centralization supports standardization. Decentralization supports service and differentiated purchase strategy. Important to align strategy and system. The level of centralization is depending on how big part of the decisions that are made centrally.	The catalog and less freetext orders support centralization. The approval matrix is not changed with the ERP system. No official strategy for procurement.	Today MD is mostly decentralized. The ERP system mostly supports higher utilization of automated purchasing via standard articles. Regarding the level of centralization it is not affected much. Strategy needed.
Business Process Owner	Clear ownership is needed for a process. People who work in the process should own it. Incentives, management and routines need to support the ownership.	It will be easier for MD to own all processes from management perspective. Not a big risk to change process owner, GPRO needs to be involved in changes.	Since MD does not employ the persons who work in some their processes they need to work closely with GPRO.

5.2 Challenges

When looking at what challenges MD has ahead it is essential to take into consideration that many challenges are followed closely and approaches are taken to mitigate them by MD. They have a clear structure and governance of the project. MD has during the project been working closely with consultants and the planning and structure of the project is something that MD has invested a lot of time, money and energy into. Phases and schedules have been clearly defined and business cases were used to prepare for the project. The challenges have been taken into consideration early in the project and it is obvious that the personnel involved in the ERP project is well informed of the common challenges that might occur during an ERP implementation. As the study is from a single point in time it might have been differences in how the challenges were perceived earlier or how they will be perceived later in the project. As different phases of a project involve different challenges it might also affect the current focus in forms of what challenges that are important to consider at the specific moment. Furthermore knowledge and understanding of a challenge has a tendency to mitigate the challenge but sometimes the knowledge alone is not sufficient. It is therefore important to continually work with the challenges even though they have been communicated well. See summary table in 5.2.7.

5.2.1 Master data

“Technical issues like master data” was perceived as the biggest challenge by the interviewees and scored an average of 4,21 in the ranking. This challenge was considered as the highest from all but the offshore personnel. Many interviewees said that master data is the foundation for a successful implementation and that the data quality will improve (Question 10, Appendix 6). This is backed up by Gulla and Mollan (1999), who suggest that a well functioning ERP system is dependent on the master data. Judging by our conversations with the respondents there are many companies that do not prioritize the work needed to have a well functioning management process of master data since management does not see the profitability of the master data management. Another reason

could be that there are companies that do not yet know about the benefits of having a well-functioning management process of master data. MD is well aware of the criticality of having good master data and the ERP Programme will handle data management during implementation. After implementation a “Master Data Group” will be established within each BU. Data management is necessary in order to align, clean and manage master data across entities within each BU. This will improve validity and business value of processes and reporting and is in line with Loser (2006) who states many advantages with having high quality master data

It is however interesting that the master data was perceived as the biggest challenge as this was nothing that was looked at closely by Nah et al. (2002) when studying the most common challenges during an ERP implementation. The fact that MD has master data as the biggest perceived challenge could mean three things:

1. Firstly it can imply that MD has not looked into other “softer” challenges such as organizational challenges and people challenges mentioned by Aladwani (2001). This could then lead to a lack of knowledge of the challenges concerning these and thereby no awareness of them.
2. Secondly it could mean that MD has worked very well with organizational and people challenges and thereby mitigating these from the project due to workshops, consultants, change management programs, etc.
3. Thirdly it could be because the master data is something that is current in the project. The establish phase is about preparing for go-live and here the master data is in a more critical stage while the “softer” challenges are not yet realized.

The researchers believe that it is a combination of the second and third alternative mixed with the fact of the split IT landscape at MD. The split landscape includes many databases from different systems, incorrect information, duplicates, etc. in the master data and has been something that has been a problem for MD explicitly and not that common in other industries or companies.

5.2.2 Challenge of change

The second biggest challenge was “Not taking the challenge of change into consideration”. The respondents overall considered MD as a change oriented company (Question 24, Appendix 6). They also stated that the willingness to change differs on different levels in the organization. At the management level and in the ERP team the willingness to change is bigger than on the rigs. Since they are in the project, work with it, hear about it and affect the outcome their buy-in to the change will be easier than on the rigs.

Many organizations can underestimate the effects that change management can have on an implementation but MD has throughout the project devoted much resources to these two important components of ERP success.

Create a sense of urgency

It is easy to be satisfied with what you have but because of the ambitious future growth plans, the ERP project is today an incredible important project for MD. So from the company point of view it is an urgent project, as MD does not go into a segment where they cannot be market leaders. Last year one of their rigs had start-up issues because of a lack of overview of the maintenance and training requirements that ended up costing USD 60 million. Using examples as financial losses or inform about potential problems is according to Kotter (1996) a way of spreading the feeling of importance throughout the company to enable the change. The sense of urgency is high at the MD headquarters, but at GPRO there has been lack of communication and they are not very stressed about the system even though they will get good benefits. As GPRO is an important stakeholder, more efforts has to be made before the roll-out to create more urgency, otherwise MD has done a good job so far.

Form a powerful coalition

Leadership must work to effectively understand, target and engage both internal and external stakeholders. By ensuring that there is clear ERP governance with members from various departments and backgrounds they have mitigated some of the organizational adjustment challenges

posed by an ERP implementation. The CEO of MD is also a part of this coalition making it more powerful. This can add different outlooks and expertise to the project and if MD would staff its project teams only with managers from one department and fail to include others it could lead to struggles in the adjustment to change. These all contribute with the knowledge and experience that is needed for a successful project. This is in accordance with Kotter (1996) who argued that the teams should be built up with the best people in the organization from different departments mixed with consultants.

Create a vision for change

In the questionnaire most people agreed that there has been a clear vision in the ERP project (Question 23, Appendix 6). However when asking what the vision was the answers were divergent and generic and it was clear that the vision had not been clear enough and thereby not accordingly to Falkowski (1998) who suggested that the goals and visions needs to be clear in order to get commitment. Underestimating the power of vision can be dangerous as it is a factor that can align people behind something common. The vision has been *“To achieve global integrated, efficient and transparent business processes and ERP landscapes providing superior support of each individual BU’s overall Mission, Vision and Strategy”*. This statement is something that could be hard to grasp for many of the employees. Kotter (1996) says that the vision should be something that is simple and to avoid all jargon and technological phrases. Instead, he argues that it could be useful to use metaphors, analogies and examples in order to spread the vision. An example in this case could be something like *“Tear down the walls and connect the islands”* that would be easier to relate to. An idea to approach this could also be to use personnel from marketing doing the communication with easy messages that should be easy to memorize and understand.

Communicate the vision for buy-in

In an attempt to change the attitudes of potential users of ERP, management must first try to affect the users' attitudes. This was the part of the empirical part that differed the most between the different

stakeholders. The people involved in the project experienced the communication as good while GRPRO said they had not been communicated enough. Concerns were also brought up about the offshore personnel and how the communication has been towards them. Brochures, videos and other internal material had been used but the risk is that the communication is one-sided. By having more interaction with the end users (such as workshops) this has tried to be resolved, which is accordingly to Parr and Shanks (2000) who emphasizes the importance of involving the end users in the design and implementation.

To get the users to buy-in to the ERP system is a critical success factor (Kotter, 1996) and there is always difficulty in adapting to a new culture of computerized environment. By hiring experts as consultant within change management that could guide and inform about the transformation MD has tried to ensure alignment and getting people to be open minded with respect to working in new ways, which is in line with Umble and Umble (2002) who suggests that a need for change must be recognized in order to succeed. End users must understand the benefits before they can ever achieve true buy-in. Important factors such as in the leadership, assurance of the organization's commitment to the project, understanding of the goals and vision of the project and the training and supervision is necessary to make the transition to the new system without reliance on old processes or workarounds. As any new software will result in change to business processes, it entails a need for communication, support and training. Face-to-face communication is however hard because of the unavailability to the rigs, which makes the mid-managers to key players in this. However some interviewees stated that it takes time for information to travel from top management via mid-managers and out to the rigs. The information can also be subject to interpretations, which disturbs the communication making it less likely to be acknowledged.

It is also hard to reach to the personnel at the rigs as they have their operational duties and do not have time to be concerned about a new ERP system. With this said, training will be an important step in securing the quality of the system. If the users don't know it they can't use it.

Interviewees meant that the rollouts will be critical and full-time support needs to be available for the users so that the system can be used. By setting high demands on the functionality and the latency issues MD hopes to resolve the resistance from end users, since these are big benefits for the offshore personnel.

Empower others to act on the vision

Major internal transformation rarely happen without support from the people concerned. MD has been good at empowering people within the ERP project but outside of the ERP project less work has been done. This concerns the offshore personnel and is something that will have to be done during the go-live phase. When a new system is brought in employees with longer years of service will feel like “it is like sweeping away the carpet under their feet”. Empowering these people and making them to ambassadors will likely lower their resistance to change and instead increase the anticipation for the new system

Create short-term wins

MD has milestones after each phase and the bonus for the project teams is calculated on how well they will be able to comply with the phases and milestones. This will create a boost in motivation and keep up the momentum, which is important according to Kotter (1996).

Consolidate improvements and produce more change

This stage has not been achieved yet but is something that MD must do after the ERP implementation. In big changes it is important to learn from the successes and mistakes (Caron et al., 1994), which MD has good possibilities to do since they implement site by site and can document the “lessons learned” from each implementation. Evaluation and follow-ups of the ERP and processes is an important step in achieving continuous improvements (Kotter, 1996). If the project gets successful MD must learn from what have been done well but also from aspect that has not been so successful. These learnings can then be brought in to other change programs or future development of MD.

Make the change stick

This is also a stage that MD has not come to yet so there is not much empirical data on it. However the researchers believe that this stage is one of the most important since resistance to change is not something that is actual just during rollouts but it can also maintain and even reoccur later in the project. By having an open and clear communication with personnel on the rigs this can be mitigated. Conventional ways of working are not easily broken and leaders from MD and rig managers must show that the new way of working is the best and to enforce this into the culture of each rig. This enables the chances of success in the long run (Kotter, 1996).

5.2.3 Business involvement

“Business is not enough involved leading to wrong design of solutions” was perceived as the third biggest challenge. To mitigate the risk of having the business not involved sufficiently in the design, MD has created a detailed design plan with early business unit involvement. They also have a business reference group that decides on business issues that is raised by the ERP team and ensures that the solutions will meet the defined requirements. This ensures that the ERP solutions reflect the needs of the business. This way of working is encouraged by Nah et al. (2002) that emphasizes the need for a good project management that can contribute with a holistic view to set the scopes and limitations with regards to the amount of process reengineering. At MD the BRG works in this way by deciding upon cross functional business and process decisions that needs a holistic view, which might be hard to attain from the ERP team that works in specific areas.

5.2.4 Business requirements

The fourth biggest challenge was “Requirements not covering business needs”, and is the challenge with the biggest differences in perceptions between the stakeholders. Offshore and Group Procurement ranked these challenges higher than the rest and the vendor and MD Procurement ranked them among the least challenging. A reason to the higher ranking for these could be that they have not been closely involved in the actual setting of the specifications. The head of procurement also stated that the

range of requirements was too wide and the specifications were unclear and the offshore personnel implied that they were not enough involved in the actual setting of the requirements. Because of this the perceived challenge in this was higher for them. Altogether there were about 1900 requirements, which made the process complicated and unaligned. The many requirements indirectly affect the degree of customization as more requirements limit the vendors in finding the most suitable solution. The requirements are in the deal that they have made with MD and an alternative would be to set functional requirements that specifies *what* a certain process should achieve and not *how* it should achieve it.

5.2.5 Top management support

From the respondents we could tell that there has been a strong support from the top management. They have from an early start supported the project and therefore this was ranked as the lowest challenge. This can be seen as a result of the fact that there was a strong support and it was therefore not considered as a challenge (Question 16, Appendix 6). MD has stated in their material that strong executive and management commitment is essential. They have setup a clear programme organization that covers all the business units and functional business areas. Within each business unit there is a team lead that has the major responsibility for the track. Leadership and clear responsibilities is something that is a critical factor in many large-scale projects and MD has been structured and prepared for this. Claus Hemmingsen, CEO of MD, stated from the beginning that the current ERPX and RFMP system cannot be relied upon any longer and a new IT landscape is incredibly important for the future of MD. Claus Hemmingsen is also a member of the business reference group where all the major decisions are taken. This is believed to have a positive impact on the project and the support given to the ERP team, which is in line with Umble and Umble (2002) who means that good leadership and commitment is critical. See more under "Form a powerful coalition".

5.2.6 Cross-functional processes

Top management support is also important in order to make processes more cross-functional. The older ERP system has not been supporting an

effective collaboration between offshore and onshore. With the new system processes in place it will be easier to implement business processes that enables transparency, are more streamlined and cross-functional. At MD the business reference group is responsible for making decisions and agree on cross-functional solutions. When doing changes it is important, which the team lead meant, to look at how the processes affect each other, since many processes are intertwined. If something changes, the risk is that it affects other processes as well. MD has a lot of help from the vendors with this but they cannot expect them to take on this responsibility solely. Holding cross-functional workshops, which makes sure that all functional business areas are covered to see how process changes would affect other areas, mitigated this challenge,

5.2.7 Summary table of the analysis concerning challenges

Table 6 Summary table of the analysis concerning challenges

Topic	Analysis		Comment
	Theory	Empirical	
Change culture	A company needs to be change oriented or at least become change oriented in order to do a big transition	ERP maturity in the firm was considered low and CM was needed in the project. The respondents overall considered MD as a change oriented company. Resistance expected from offshore, less from HQ.	Different levels of change orientation in company. MD needs to look closely at how the offshore personnel perceive the project and how they will meet the changes.
Implementation challenges	Factors that affect the success of an ERP implementation are dependent on how the following criteria's are met: <ul style="list-style-type: none"> • Top management support • Change management program and culture • ERP teamwork and composition • Business plan and vision • BPR and minimum customization • Effective communication • Software development, testing and troubleshooting • Monitoring and evaluation of performance 	<ul style="list-style-type: none"> • Master data – Start a master data group within each BU • Change management – Hiring consultants within CM • Difficult to communicate to the offshore personnel • Rollout implications • Mid-managers communication to offshore personnel can be distorted or misinterpreted • Several ERP systems during rollout causes compatibility issues. • Scale of project leads to a complex governance • Lack of a simple and understandable vision 	<ul style="list-style-type: none"> • MD has a good and structured approach to the project with a good teamwork and composition. • Change management has been something that MD has been planned well with help from consultants. • Top management support is good. • A well thought business plan and vision has been done. • Structured approach to BPR and customization issues. • However the communication with the offshore personnel has not been as good as planned. • Master data is a big challenge and is not something that is brought up closely in theory • To many requirements and the end users were not enough involved in setting the requirements.
Kotter 8-step model	<ol style="list-style-type: none"> 1. Create a sense of urgency 2. Form a powerful 	<ol style="list-style-type: none"> 1. Financial statements of losses and potential problems 	<ol style="list-style-type: none"> 1. MD has used good examples to create a need for the project.

	<ul style="list-style-type: none"> 3. coalition 3. Create a vision for change 4. Communicate the vision for buy-in 5. Empower others to act on the vision 6. Create short-term wins 7. Consolidate improvements and produce more change. 8. Make the change stick 	<ul style="list-style-type: none"> with the current ERP system. 2. Well structured ERP governance with people from various departments and backgrounds. 3. Unclear vision that should be changed to easier grasp the meaning of the project. Avoid jargons. 4. Well communicated via different channels. Needs to make sure that the information is received and acknowledged. 5. Well done within the ERP project but less on the offshore personnel. 6. Milestones with bonuses 7. No empirical information 8. No empirical information 	<ul style="list-style-type: none"> 2. CEO member of coalition and members from various departments making it powerful. 3. Needs to restructure the internal vision so that it becomes more simple and understandable. 4. Good information and many channels. Make sure that the communication reaches the end users. 5. Having change agents who can lead the transition on the rigs is a way to meet the resistance to change. 6. Good to compensate based on performance, which keeps momentum up. 7. Continuous improvement and follow-ups to evaluate performance. 8. Managers must show the benefits of the new system.
Cross-functional processes	Important that the organization coordinate processes. The information systems must support cross-functional processes rather than only focusing at departments.	Intertwined processes. Hard to know how some changes in a process affects another process. At MD the business reference group is responsible for making decisions and agree on cross-functional solutions.	MD has a strong top management support and a BRG that helps to get the holistic view of the processes. This is essential in getting the new ERP system to support more cross-functional processes

6 Conclusions

This chapter answers the research questions. The conclusions are based on the analysis in the previous section.

6.1 Changes

The new ERP system has been a clear enabler for the change and improvement of supply chain and procurement processes at MD and MD has a good knowledge of what processes should be customized, and what should be standardized. With the changes the processes will become more streamlined, standardized and cross-functional.

Standardization

The standardization of processes will support exchange of best practices and scalability and thereby support the future growth of MD.

Cross-functionality

Cross-functionality will increase with the new ERP system. Integrating different functions will improve the cooperation between maintenance and procurement where the planning will be enhanced with same real time data.

Information sharing and transparency

Less time will be spent on tracing orders due to increased transparency, leading to lower administration costs. Increased information sharing will help MD to work more effective and furthermore the ERP system will support lower inventory by transparency, as shown in other studies.

Additional and improved data

The major changes involve increased usage of the catalog of standard articles, additional data for the evaluation of suppliers and additional use of frame agreements. MD will get an improved overview from management reporting when owning all processes. MD will be able to access the data since they own it. Improved data will help in evaluating and choosing suppliers, and to realize these benefits MD needs to have good master data.

Centralization

The new ERP system increases the use of the central purchasing with higher use of standard articles. In MD the opinions on centralization differs. The approval matrix of purchasing is not affected, so the ERP has not affected the centralization of the procurement very much. The view of the interviewed persons were scattered regarding how the ERP affected the centralization of the procurement.

6.2 Challenges

Structured project reduces challenges

It is clear that there is knowledge of the challenges among the parties. MD has a strong top management support and the CEO and managers from various departments are members of the coalition making it powerful and a force for enablement. Top management support was not considered a top challenge, which can be explained by the strong support from the CEO and that the project has been given sufficient resources from top management. This has led to a good and structured approach to the project. The need for change has been identified and change management programs has been something that MD has planned well with help from consultants. They have also used a structured approach to BPR and the customization issues.

Unified view of challenges

The most common challenges at MD are general and occur in various implementations. MD has awareness of the situation and the potential challenges, which has been communicated well. This has unified the different stakeholders in their perceptions on the possible risks in the ERP implementation.

Master data

Of the different challenges, master data was the biggest perceived challenge. This is because of the fact that the project is in the establish phase and that MD has a starting point with very poor data.

End user buy-in

There are different levels of change orientation at MD with regards to the offshore personnel who are considered to be more change resistant. MD therefore needs to look closely at how the offshore personnel perceive the project and how they will meet the changes. End users must understand the benefits before they can ever achieve true buy-in and the challenge of change was perceived as a big challenge. As an example it was stated that there were too many requirements in the planning phase and by not having the end users involved in setting the requirements could be a future challenge. The vision was also containing technical and management jargons, which makes it less understandable. Today they use many channels but MD needs to make sure that the communication reaches the end users.

7 Recommendations and Future Research

This chapter follows up the previous conclusions and gives recommendations and proposals for further research.

7.1 Recommendations

Since the thesis is descriptive and explanatory the recommendations are few. However when comparing the MD case with literature and talking to different actors the researchers have found areas which are important to work with and which could be improved. Obviously communication and change management are important tools for making the transition smooth. The recommendations are:

- MD should have designated change agents on the rigs that can communicate the vision well with the offshore personnel. Having people on the rigs seems to be the best way to make sure that communication reaches the personnel. Here it is a good opportunity to make people with good knowledge in old systems to change agents to decrease their resistance.
- MD needs to keep sure that the quality of the master data not suffers although there are tough time limits. In the interviews it was stated that the time limit might affect data quality. Considering the importance of precise master data extra resources or time might be needed to make sure that the quality is not suffering.
- In order to get full support in the process ownership MD has to make sure that the people hired by GPRO has the same incentives and structure as MD personnel, and have a close collaboration with GPRO.
- The vision is full of management jargon. To make it stick more and be easier to remember and easier to relate to it would be beneficial for MD to use a language of metaphors. An example of that could be “connecting the islands” or similar expressions in the vision.

- Develop and announce an official procurement strategy for MD, to know what strategy to support and to have better guidelines to follow both in ERP project, procurement work and GPRO relation. When asking people about the procurement strategy it has not been easy to get a clear answer and having a strategy is important to simply know what to strive for and what the objectives are.

7.2 Future Research

As in all studies there are many areas found, which would be interesting to investigate further.

The study was delimited to the supply chain and procurement area and internally of the focus company. An opportunity for future research is to widen the view and interview customers and suppliers as well to get their views on the change of an ERP system. It would give a more “all around” view rather than only the focus company.

In previous studies that the researchers have encountered, most of the focus of how ERP systems affect purchasing, is on administration, lead times, planning and working capital. In the articles the researchers did not find much information about how ERP systems can be used to handle contracts and service procurement. Considering the high level of service procurement, the area is interesting to look further into.

This study was in a single point of time due to insufficient time. To follow how the perception of challenges in an ERP project change in a time series study would be very interesting. It would provide a view of how the perceived challenges are approached and how the perceived challenges change during the project. Studying how a company like MD over long time comes closer and closer to their supplier in regards of ERP and information sharing would give insight in the process.

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Appendix 1. List of persons interviewed

Title	Actor	Short Description
Head of Procurement	MD	Head of the procurement department at MD. Report to CFO. Bring synergies in procurement and develop it.
General Manager Procurement	MD	The general manager in procurement works with creating processes and with management systems.
Supplier Relationship Manager (SRM)	MD	Works with supplier projects. Experience in logistics and procurement.
ERP Team Member	MD	ERP team – Procurement and SCM, specializing in procurement with experience from GPRO, with procurement and SCM.
ERP Team Member	MD	ERP team – Procurement and SCM, specializing in inventory with ERP experience.
ERP Team Member	MD	ERP team – Procurement and SCM, specializing in logistics with academic experience.
ERP Team Leader	MD	ERP team – Procurement and SCM, deep technical knowledge and experience from ERP projects
Materials Man	MD	ERP team - Operations and Maintenance, with offshore experience as a materials man.
Materials Man	MD	ERP team -Operations and Maintenance, with offshore experience as a materials man.
Consultant	Implementation Consultants	Consultant with experience from many projects in SCM.
ERP consultant	ERP Vendor	ERP vendor consultant with focus on SCM. Experience from several large ERP projects.
Lead Buyer	GPRO	Lead Buyer, Maersk Group Procurement. Experience from purchasing and logistics.
Key Account Manager (KAM)	GPRO	Key Account Manager, MD Group Procurement. Handling the purchasing for a rig. The rig is the “Key account”.

Appendix 2. List of data collection

Pre-study Interviews (15 min), unstructured

Title	Date	Company
Head of Procurement	20130927	MD
ERP Team Member	20130927	MD
ERP Team Lead	20130924	MD
Materials Man	20130927	MD
Supplier Relationship Manager	20131001	MD
ERP Consultant	20130924	ERP Vendor
ERP Team Member	20130918, 20130930, 20131017	MD

In-depth semi-structured interviews (90 min) and questionnaire

Title	Date	Company
Head of Procurement	20131025	MD
General Manger Procurement	20131022	MD
ERP Team Member	20131022	MD
ERP Team Member	20131030	MD
ERP Team Member	20131029	MD
Materials Man	20131029	MD
Consultant	20131024	Implementation Consultants
ERP Consultant	20131107	ERP Vendor
Materials Man	20131022	MD
Lead Buyer	20131024	GPRO
KAM	20131029	GPRO
ERP Team Member	20131025	MD

Supplier meeting with Maersk Oil Trading

Title	Date	Company
General Manager Procurement	20131004	MD

Appendix 3. Archival references

Presentations	
Executive Presentation	ERP ITSC Executive presentation Oct v1 7 (v2) (Purpose with new ERP and potential benefits)
Programme Structure	ERP ITSC meeting 20111121 Nov v 2 1 - Post ITSC (ERP Programme structure)
Strategy Proposal	ERP ITSC Strategy Proposal Oct v1 6 (v2) (LONG STRATEGY DOCUMENTS)
Project Introduction	ERP project introduction to MD towmasters
Vendor Solution Presentation	ERP vendor solution presentation (A2)
PETIL	Presentation for PETIL meeting
Shorebase Meeting	Shorebase Manager Meeting JME_Nov 13 2012
Guiding Principles	MD Guiding Principles, FINAL, Apr 2013
Business Case Benefits	MD ERP business case benefits

Sirius	
Sirius	Supply Chain Management and Procurement (Folder with maps over old processes)

Text files	
Risk Assessment Report	MD Risk assessment report Q1 2013

Webpage	
Intranet	Intranet for the ERP project with information.

Appendix 4. The interview guide

A. *Background*

1. Describe your position in the company and what your responsibilities are?
 - 1.1. What kind of business processes are you involved in?
 - 1.2. What kind of activities do you do in these processes?
 - 1.3. What is the purpose of the processes that you are involved in?

B. *Procurement and SCM*

2. Describe shortly the procurement/SCM strategy?
 - 2.1. Are the new processes more aligned with this strategy?
3. How centralized is the purchasing today?
4. Maersk Drilling and Group Procurement will work in the same process, and ownership is transferred to Drilling, what are the challenges here?
5. How are the process changes affecting roles and responsibilities?
6. How have the following activities changed in the new processes and what are the challenges with the changes? How does Maersk work with these challenges?
 - 6.1. Setting specification
 - 6.2. Supplier selection
 - 6.3. Handling and making contracts and agreements
 - 6.4. The ordering process
 - 6.4.1. What about frame agreements?
 - 6.5. Tracing and monitoring
 - 6.5.1. How are freetext orders affected? Why?
 - 6.6. Evaluation of supplier
7. How will the inventory management change?
8. How will the logistics/distribution change?
9. Which departments are important to coordinate with purchasing? Why? How does it work?
10. What are the new possibilities for a rig with the new system within procurement and SCM?
 - 10.1. What incentives are there for the rig to use them?
11. How will cost of procurement/SCM be affected?
12. How important is the quality of the master data? Why? Challenges?
13. What challenges in a broader sense, supply chain-related?

C. *Processes*

14. In which way has the processes been changed and how much in terms of;
 - 14.1. Standardization
 - 14.2. Transparency
 - 14.3. Cross-functional
15. How are most processes changed? Improved or totally redesigned? Challenges?
16. Which role has the ERP system in all the redesigns of the processes?
17. How much has the ERP vendor contributed with best practice?
18. Why change business process owner to Maersk Drilling?

D. Change Management

19. How “change-oriented” is the culture at the company? What problems? Why?
20. How is the top management support in the project?
21. How urgent is the project? Why?
22. What do you think of the mix of people in the project-teams? How does it matter?
 - 22.1. Example?
23. What is the vision with the new system?
 - 23.1. How was it communicated?
24. What challenges are there in the rollout? How working with?
25. Where do you see the biggest resistance to the ERP project?
 - 25.1. In case of problems during implementation, how will it affect procurement?

E. ERP

26. What are the main problems for Maersk Drilling with using standard processes from the ERP vendor? Why?
27. How does the system fit with the organizational structure? A challenge?

Appendix 5. The Questionnaire

Please consider the following statement and put a ring around the number 1-5 depending on how correct the statement is where 1 is strongly disagree and 5 is strongly agree.

	Disagree			Agree	
1. The contract agreements will be easier to manage	1	2	3	4	5
2. The ordering process will be slower	1	2	3	4	5
3. Tracing and monitoring orders will be easier	1	2	3	4	5
4. Supplier evaluation will be improved	1	2	3	4	5
5. The purchasing will be more decentralized	1	2	3	4	5
6. The coordination between functions will be better	1	2	3	4	5
7. The order lead-time will decrease	1	2	3	4	5
8. The planning will be better with transparency	1	2	3	4	5
9. The service to the rigs will improve in the supply chain	1	2	3	4	5
10. The data quality will improve	1	2	3	4	5
11. The customers are more integrated in the new system	1	2	3	4	5
12. The suppliers are more integrated in the new system	1	2	3	4	5
13. The new processes are overall more streamlined	1	2	3	4	5
14. The resources in supply chain will be used more effectively with the new system	1	2	3	4	5
15. The new processes are more cross-functional than before	1	2	3	4	5
16. There has been strong top management support in the designing of the new processes	1	2	3	4	5
17. Most of the processes has been improved	1	2	3	4	5

rather than redesigned from scratch					
18. Most of the processes has not been changed	1	2	3	4	5
19. We could have changed the processes without the new ERP system	1	2	3	4	5
20. We have found much waste in the old processes	1	2	3	4	5
21. There are more "hand-overs" between functions in the new processes.	1	2	3	4	5
22. The ERP project team has a good mix with people from the different functions that are affected	1	2	3	4	5
23. There is a clear and understandable vision for the project	1	2	3	4	5
24. Change is a part of the company culture at Maersk Drilling	1	2	3	4	5
25. There are big disadvantages with standardizing the processes to fit the standard processes of the ERP system.	1	2	3	4	5
26. The new ERP system does not fit with the Maersk drilling organization.	1	2	3	4	5
27. There is not enough understanding about existing data and IT across the organization	1	2	3	4	5
28. The costs in procurement will be reduced	1	2	3	4	5
29. The quality of the activities will improve	1	2	3	4	5
30. More money will be spent on frame agreements in purchasing	1	2	3	4	5

Internally rank the five biggest challenges, according to you, in the implementation related to procurement and SCM (5 most important, 1 least important)? Further down you can add your own suggestions.

Weak top management support

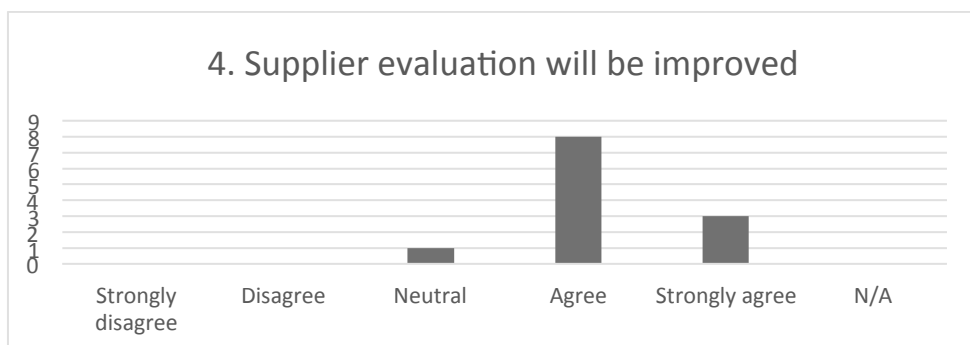
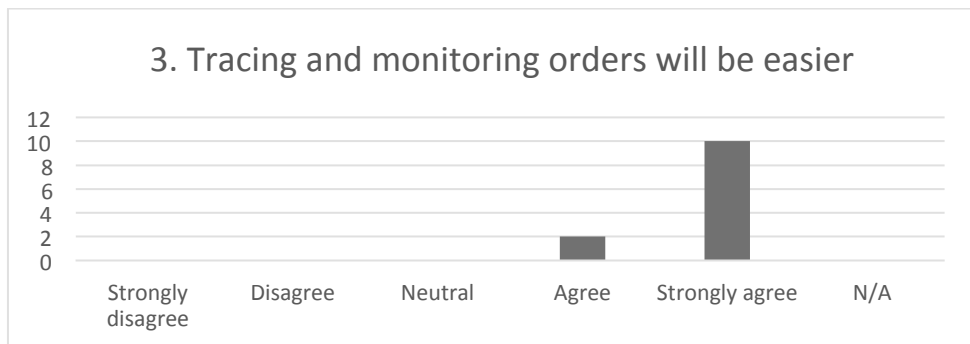
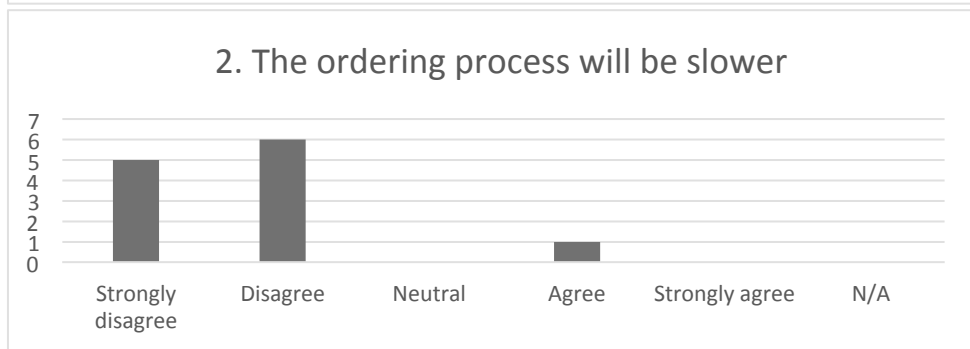
Not taking the challenge of change into consideration

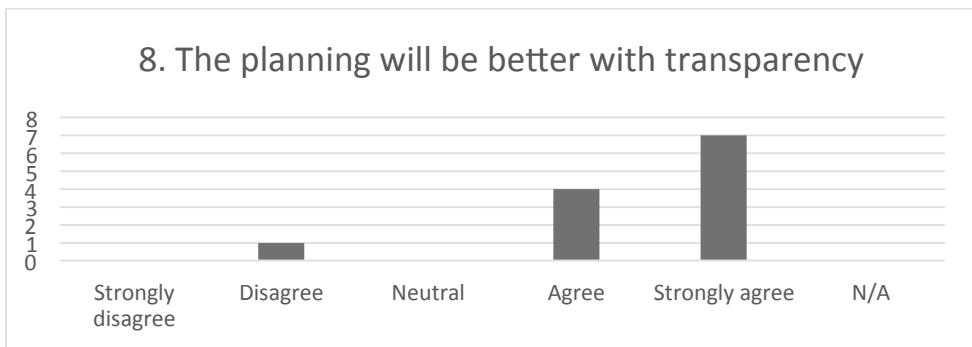
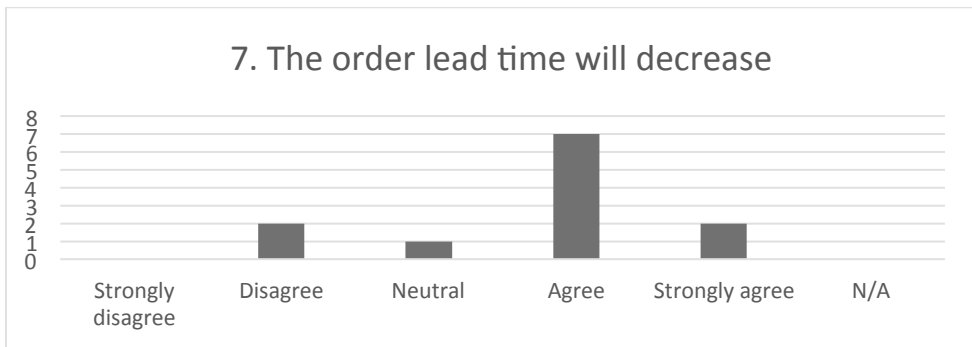
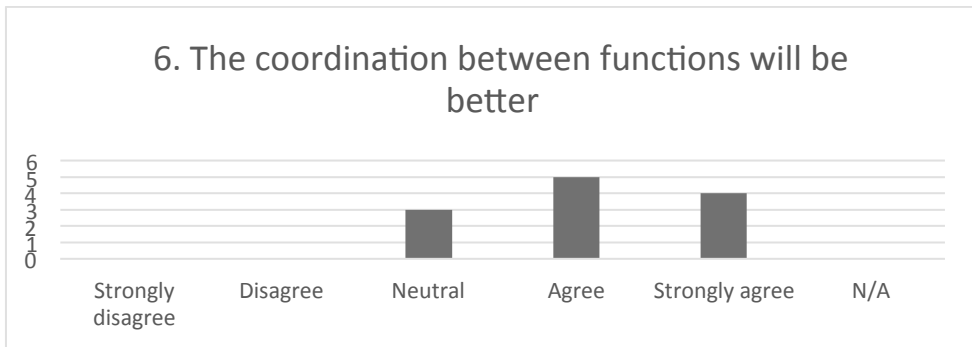
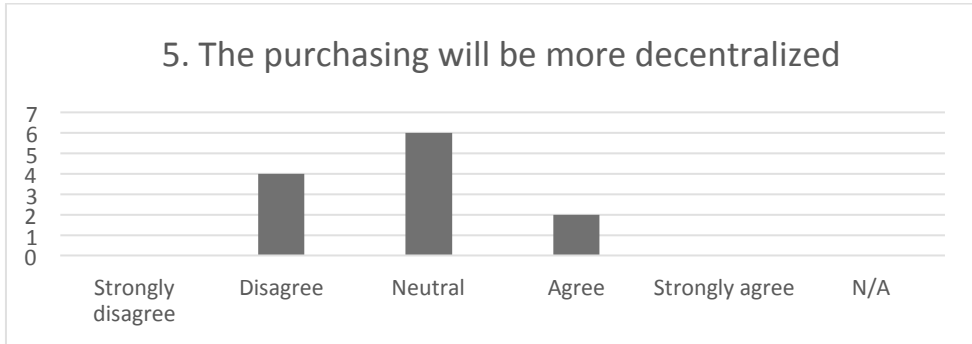
Technical issues like master data

Requirements not covering business needs

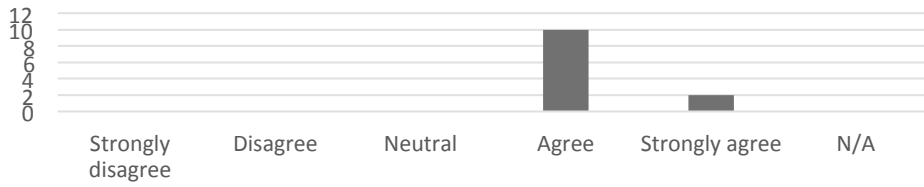
Business is not enough involved leading to wrong design of solutions

Appendix 6. Questionnaire answers

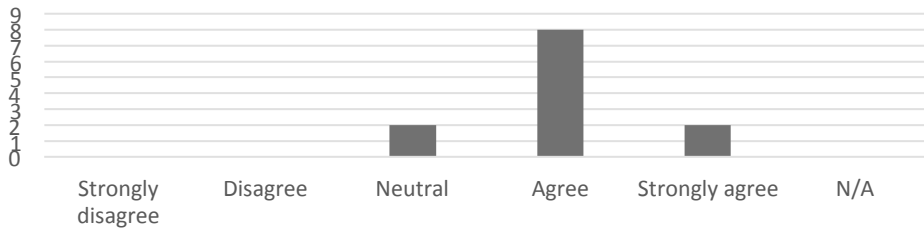




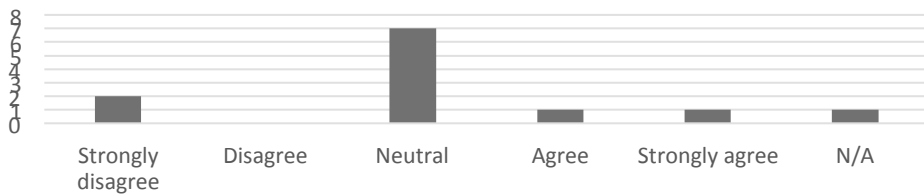
9. The service to the rigs will improve in the supply chain



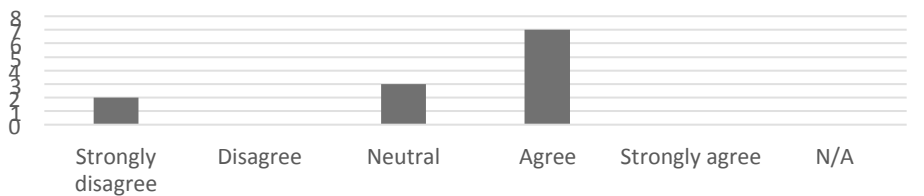
10. The data quality will improve

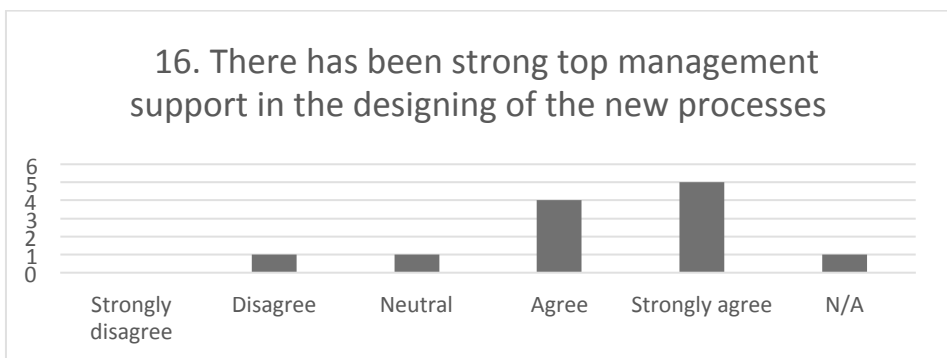
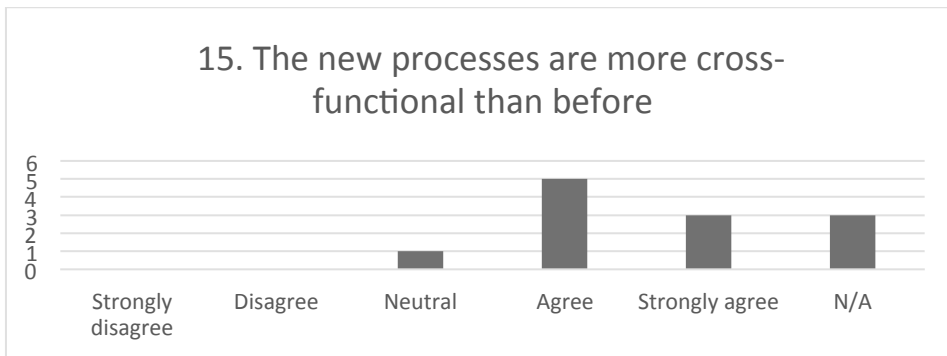
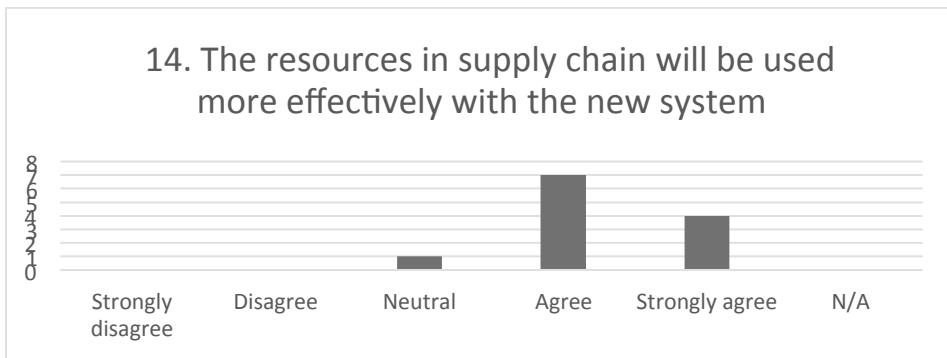
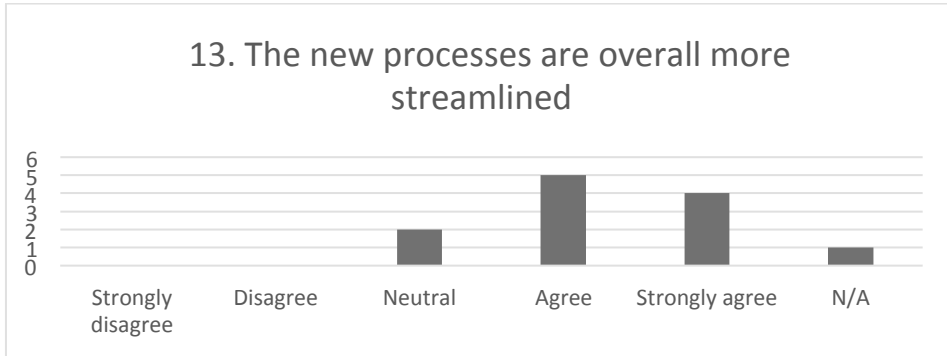


11. The customers are more integrated in the new system

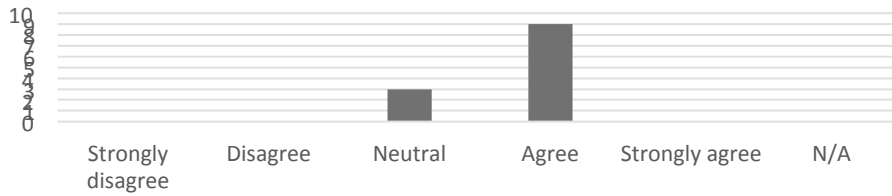


12. The suppliers are more integrated in the new system

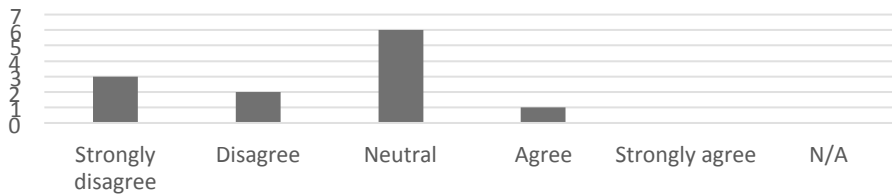




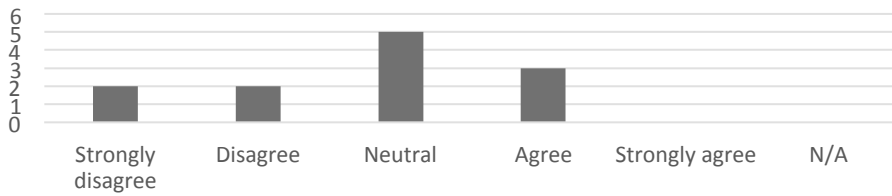
17. Most of the processes has been improved rather than redesigned from scratch



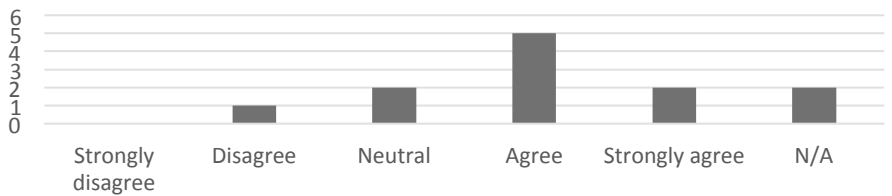
18. Most of the processes has not been changed



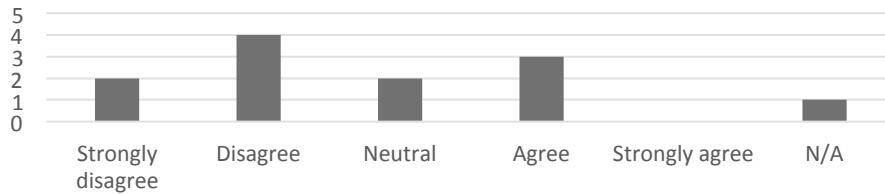
19. We could have changed the processes without the new ERP-system



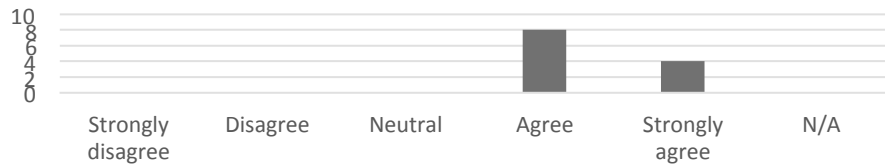
20. We have found much waste in the old processes



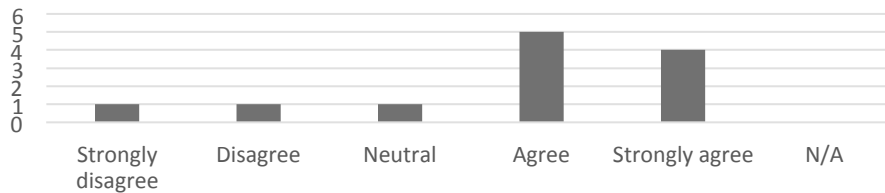
21. There are more “hand-overs” between functions in the new processes.



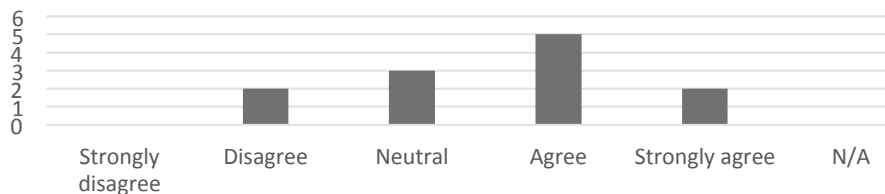
22. The ERP-project team has a good mix with people from the different functions that are affected



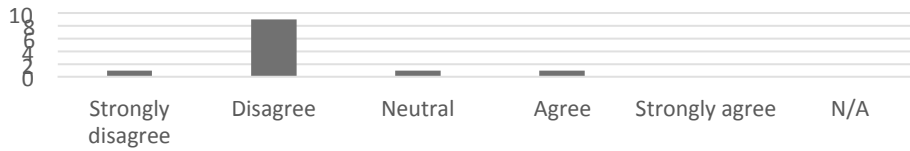
23. There is a clear and understandable vision for the project



24. Change is a part of the company culture at Maersk Drilling



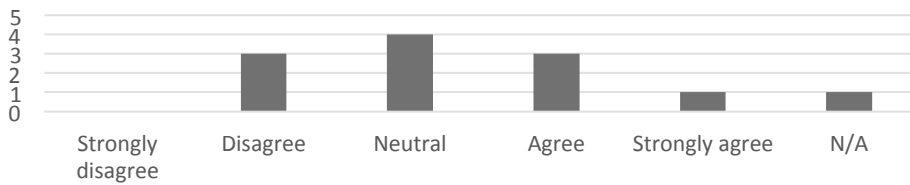
25. There are big disadvantages with standardizing the processes to fit the standard processes of the ERP system.



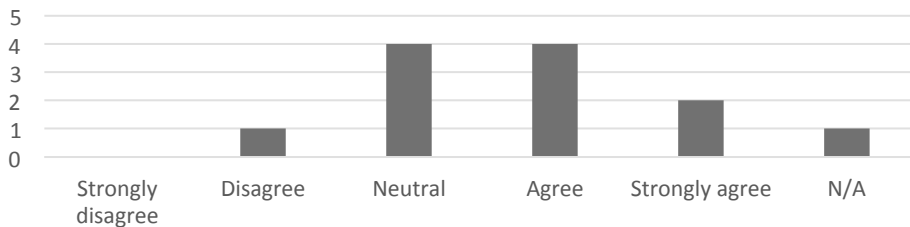
26. The new ERP system does not fit with the Maersk Drilling organization.



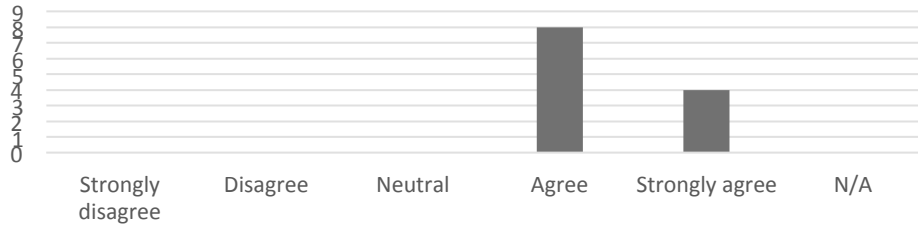
27. There is not enough understanding about existing data and IT across the organization



28. The costs in procurement will be reduced



29. The quality of the activities will improve



30. More money will be spent on frame agreements in purchasing

